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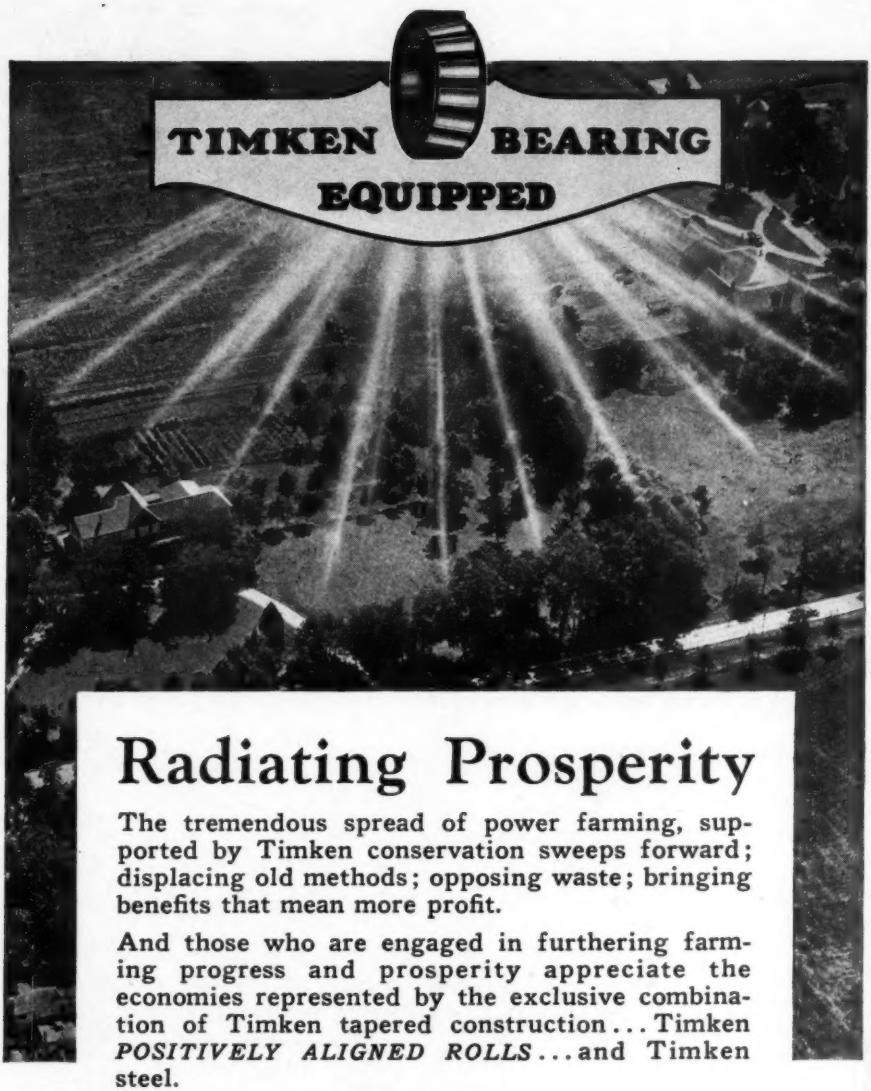

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R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

Editorial Offices: 19 West 44th Street New York

VOLUME XIII NUMBER TWO

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Agricultural and Scientific Bureau
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In the Canadian Big Woods

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VOL. XIII NEW YORK, AUGUST, 1929 No. 2

Here is Jeff's "Scotch" story—

Economics

By Jeff McDermid

ECONOMICS is one of those excessively plural nouns that take a singular verb. There are more branches of economics than there are people who understand them.

Economics means one thing to a Scotchman and something else to a Chinaman. The acquisitive seminars in economics appeal to the former, while the pay-as-you-enter classes are attracting the Orientals.

When the economic "drug store" first opened for business on the college corner, the farmers bought out the entire stock of pioneer panaceas, foremost on the shelf being the flagon marked "cost of production plus." They didn't read the prescription directions in some cases and got too much plus, but after shaking well it acted as a sedative for a few years.

Next they demanded some of the patent commodity contract porous plasters which were heralded widely by a vehement pseudo-economist who didn't have a license to operate a dispensary. After being vicariously drenched, dipped, and flushed with the antidote, they couldn't tell poison from pickled pigs' feet, and in order to administer it scientifically, the patient had to be roped and hog-tied. Albeit, some of the patient survivors have managed to find ways of using the remedy to stop growing pains and reduce over-expansion at the belt line.

Should you now ask what brand of economic medicine agriculture wants most, go through the hefty economic

materia medica and ask which is safest —equalization fees, domestic allotments with transferable rights, excise fees and bonuses, export debentures, or a night raid on the country bank.

A well-known engineer has tried the slide rule on it, but he may abandon that for the pitchfork.

Savants in the realm of economics wear bone-rimmed specs and weary-river expressions, instead of spattered laboratory aprons. Their test tubes are adding machines and comptometers. Like their other brethren in the fussy fields of research, they are trying to classify, clarify, isolate, and inoculate.

They have discovered a number of things which they are not ready to announce, but they have announced more things that they haven't discovered. Long ago they learned that money makes the mare go, but they have been unable to supplement the ration with some synthetic fodder that keeps up the required speed without interfering with digestion.

Economists have been responsible for some of the world's clearest deductions and the world's most dismal delusions. If you were an economist, of course, you would be in the former group and all the others would be in the latter.

ECONOMISTS have been responsible physicians who prescribe and treat ailments collectively. There must be a virulent epidemic in the body politic before they are summoned, often too late. One sick horse or a potato with rhizoctonia will arouse the ardor of the homeopathic scientists, but it requires a nation suffering from the law of diminishing returns to make the economist grab his stethoscope. Then they come down in such swarms that the hospital resembles a veterinary clinic. They disagree on everything from antidotes to anesthetics, but patients with lots of faith, hope, and charity usually pull through.

There are at least three kinds of economists—the public economist, the private economist, and the domestic economist. I profess to belong to the latter group with no other qualifications than a small salary, Scotch ancestors on the off-side, and a wife who can make a beef roast both edible and versatile.

PUBLIC economists either write or teach or commit both crimes simultaneously. When you have finished reading the weather reports and the baseball news, you turn for a moment to the "cash or calamity" column edited by the specialist in grafts and graphs. As a rule these men are not college professors because the colleges employ men who are reminiscent rather than omniscient. Furthermore, the college man is perforce more of a domestic economist and dislikes gambling in futures.

I shall not follow with any discussion on the batting average of the newspaper economist. The reason is as obvious as my income ought to be. One cannot get water from a dry well. But I have a neighbor who clipped and pasted, and finally invested on the strength of such literature. Yesterday I loaned him fifty cents after I learned he had stopped his subscription.

Private economists are a blend of efficiency experts and back seat drivers. Big business in need of gas feed and a brake, headlights and bumpers will not go out on a strange highway to meet other highwaymen without these social safety devices. Lawyers are not enough for this purpose, expensive as they may be. The lawyer deals in torts and retorts, but the economist takes a socket wrench and goes after the transmission or whatever ails you the most.

Agriculture is probably the only organized business which has had a public economist work for it as a private economist. Therefore, farmers are getting along much better than ever as domestic economists. They simply

(*Turn to page* 61)

The sweet clover, left of stake, received 100 lbs. per A. of muriate of potash and yielded 2 T. of cured hay; that at the right received no potash and yielded only 1.2 T. (Deep muck, Ingham county, Michigan)

Making Mucks Pay

By Dr. Paul M. Harmer

Muck Soil Specialist, Michigan State College of Agriculture

IN the days of pioneer farming, the marsh or swamp was considered as waste land having little or no value. With the comparatively recent development of better methods of muck land farming, especially in the production of special crops, conditions have so changed that it is not uncommon to find muck soils valued more highly than the surrounding clay or sandy soils.

The composition of these muck and peat soils is very different from that of clays, loams, and sandy loams, with which most farmers are familiar, therefore, the methods of producing good crop yields on them must be decidedly different from those used on the clay and sandy soils. Generally these muck and peat soils are naturally very infertile. When reclaimed and properly fertilized, however, very good yields of practically all crops can be produced on them.

Muck and peat soils may be classified into three groups according to their adaptability for crop production:

1. Low-lime, very strongly acid soils, generally raw and fibrous.
2. High-lime, not acid to strongly acid soils, well decomposed to raw in structure.
3. Very-high-lime, alkaline soils, generally well decomposed.

The first group is a fairly small one which is characterized by its need for lime. The requirements for satisfactory crop production may vary from two to ten or more tons of ground limestone per acre. Reclamation of the more extremely acid of this group should be undertaken with caution because of the possibility of incurring great expense with rather poor crops for several years after liming. This type of muck can frequently be recognized by its native vegetation, a good growth of cranberries, swamp blueberries, sphagnum moss, dwarf tamarack, or dwarf black spruce being an indication of a low-lime muck soil.

CROP (In those columns in which two fertilizer recommendations are given, the first formula is generally preferred)	TYPE OF MUCK				Range in annual broadcast application Pounds per acre (If only muriate of potash is needed, one-half to two-thirds of these recommendations should be applied)
	High-lime Muck			Low-lime Muck	
	Deep and Medium Muck		Shallow Muck	Very strongly acid in reaction (Limestone or marl should be applied preceding fertilization)	
	Mucks requiring both potash and phosphate	Mucks showing little or no benefit from phosphate in mixture	Manure or green manure recommended in rotation		
Oats, barley, rye, with or without seeding	0-8-24 or 0-8-32	Muriate of Potash	0-20-20 or 0-8-24	2-8-16	250-400
Timothy and alsike, sweet clover, Hungarian millet, permanent pasture	0-8-32 or 0-8-24	Muriate of Potash	0-8-24	0-8-24 or 2-8-16	Meadow 200-350 Pasture 100-200
Field corn, sweet corn, sunflowers, potatoes	0-8-24 or 0-8-32	0-8-32 or Muriate of Potash	0-8-24	0-8-24 or 2-8-16	Corn, sunflowers 250-500 Potatoes 400-800
Sugar beets	0-8-32 or 0-8-24	Muriate of Potash	0-8-24	Crop not adapted	400-600
Onions, cabbage	4-8-16 or 3-9-18	4-8-28 or 3-8-24	3-12-12	4-8-16 or 3-12-12	Onions 800-1,200 Cabbage 500-800
Celery	4-8-28, 0-8-24 or 4-8-16	4-8-28, 0-8-32 or 4-8-16	4-8-16, 3-9-18 or 3-12-12	4-8-28, 3-8-24 or 4-8-16	1,200-2,500
Mint	2-8-16 or 3-9-18	4-8-28 or 0-8-24	3-12-12	Crop not adapted	250-500
Turnips, carrots, rutabagas	0-8-32 or 0-8-24	Muriate of Potash	0-8-24	0-8-24 or 3-9-18	250-600

This plot of sunflowers and corn received no fertilizer and yielded, sunflowers—11.2 T., corn—13.8 bu. (See picture below.)

It is fortunate that a large majority of our muck and peat soils fall into the second group. When properly managed, these soils are very productive. They do not require an application of lime, in fact, lime is likely to decrease the yields of certain crops on them.

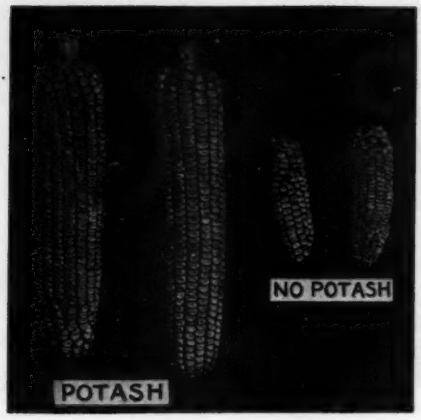
The third group, which includes the alkaline muck soils, has generally resulted from a burning-over of the muck to a considerable depth or to the fact that the soil is underlain by marl within a short distance below the surface. This group is a very small one, but does not produce satisfactory crops unless carefully handled. Plowing under of heavy applications of manure or crops of green manure tends to correct the alkaline condition, while the application of a fertilizer mixture high in potash content generally gives good yields.

In addition to these three groups of muck and peat soils, mention should also be made of two closely related soil types, namely, the black sands and the peaty loams. Many of these areas were at one time covered with a shallow layer of muck which has decomposed and become incorporated with the underlying soil. Under these conditions the fertilizer requirement of these soils remains more nearly like that of the original muck soil than like that of the ordinary (mineral) soils.

Fertilizing Mucks

In the early days of muck and peat land farming in the United States,

This plot received 200 lbs. of muriate of potash per A. and yielded, sunflowers—25.4 T., corn—60.2 bu. (Deep muck, Berrien county, Michigan)



fertilization was accomplished by the application of manure. Due to the fact that the nitrogen in the manure is its most valuable constituent, whereas potash is most lacking and nitrogen most abundant in the muck and peat soils, it is evident that manure is not a balanced fertilizer material for these soils.

Experiment stations throughout the world have shown that potash is the most important plant food element in the fertilization of muck and peat soils, with the single exception of a small group of peat soils in northwestern Minnesota. On a majority of our soils phosphate is also needed, the need for phosphate being greater with some crops than with others. While muck soils contain sufficient nitrogen to supply the needs of most crops, a few special crops, such as celery, onions, mint, cabbage, lettuce, and spinach, generally give increased yields when some nitrogen is included in the mixture.

The Effects of Potash

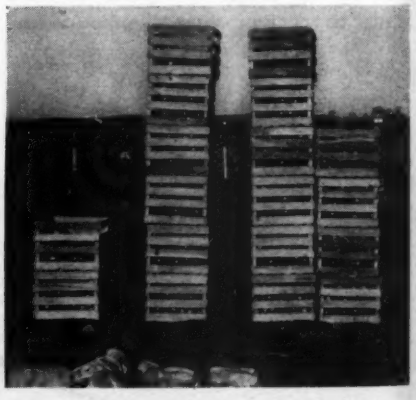
In addition to greatly increasing the the yields, potash has other very beneficial effects when applied to crops on muck soils. It improves the vigor of the crops and makes them more resistant to disease. When applied on pasture and meadow, it improves the succulency and palatability of the grass and hay. It tends to strengthen the stalk and to give plumper kernels of corn and grain. It increases the sugar content of sugar beets, table beets, and carrots. It improves the palatability and flavor of potatoes, parsnips, celery, and onions.

Potash is also of vital importance from a marketing standpoint, since practically all vegetable crops have much better keeping qualities when they have been fertilized with a mixture high in potash than when a low-potash mixture or manure has been applied. This improvement in keeping quality is evident both in storage and when on display in the market.

Fertilizer Recommendations

Fertilizer recommendations for several different crops to be grown on muck land are given in the accompanying table, together with the range in amount of fertilizer which should be applied broadcast annually. Following application, the broadcast fertilizer should be worked well into the soil. With some crops the row application will give better yields than the broadcast application. Because of possible injury to the seed, the row application should be kept at least two inches away from and preferably below the seed. Not more than one-

(*Turn to page 56*)



Onions on deep muck, Huron county, Michigan. Left to right—no fertilizer, potash, and potash and phosphate. Yields—115, 412, and 734 bu. per A., respectively.

The Loan Value *of* Farm Property

By Edwy B. Reid

Washington, D. C.

"WELL, what is the appraised value of my house, anyway? I have a curiosity to know how the experts would get at such a matter. I used to read the Department of Agriculture's bulletins when they tried to figure out a farmer's income from the cash transactions and then they would add sort of parenthetical 'this is in addition to the house rent, food, and fuel.' I guess they called house rent 'shelter,' now that I come to think about it.

"It always seemed to me that the 'wise-acres' who got these figures together had not lived on a farm, for they frequently got the cart before the horse. You know a fellow who has good shelter, meaning a good home, plenty of firewood, and plenty to eat isn't so bad off after all! There is many a city man who doesn't provide any more than this for his family, and he feels mighty lucky if he gets through the year, taking care of the doctor bills and all, without being in the hole.

"For that matter, I don't suppose a whole lot of farmers break any better, but anyway that's how the Department and a lot of agricultural colleges used to figure farmers' income. I used to smile at the 'averages' of incomes of a whole group of farmers when they left out these important items of food, fuel, and shelter, and I don't know that they have improved their processes much in recent years."

These were the opening remarks between Herkimer Smith, an outstanding farmer in his community, and Peter Jones, the secretary of the local National Farm Loan Association. They had gotten together to discuss Smith's need to re-finance his short-term first farm mortgage, and Smith was surprised to learn that the Federal Farm Loan Act, although it permits the lending up to 50 per cent of the appraised value of farm land for agricultural purposes, places the loan limit on permanent, insured buildings at 20 per cent of their appraised value. This amount seemed particularly small, in view of the fact that building and loan associations lending on city or town property, which operate to some extent in a similar way to the local National Farm Loan Associations, lend up to about 60 per cent of the value of the house and lot.

Long-term Loans

"You probably have the idea that we can lend as high as can a city building and loan association," said Secretary Jones. "You know there is really quite a lot of difference between lending on city property and on farms. In the first place the loans in the city are usually paid out in 10 or 12 years. That means in half that time the borrower has made a substantial reduction on the principal of the loan. The home-owner is fairly likely to live in his home 10 years. We lend on farms for as long as 36 years. The farmer who takes out the loan is very likely not to be the one

who is farming the land when the loan is completely paid off.

"If you will look around this community you will see that the turn-over of farm property is rather rapid, and I believe this is typical. We lend on a farm factory which includes the home. I mean by this that the farmer makes a living on the farm and lives there. The city man merely dwells in his home and has a separate business. There are two distinct units and each can be sold and handled as such. If the business goes bad it doesn't reflect upon the value of his home. That isn't true of a farm, as you know. A farm could have a palace on it and if the soil were not productive it probably would not be worth very much unless it could be used for summer resort purposes.

"There is a certain relationship between the soil and the farm buildings," continued the Secretary. "You have probably noticed in driving through the country that on good soil you will find prosperous looking homes, painted buildings, and well-kept up fences—everything in shipshape condition. The opposite is true regarding poor soils. I don't mean to say by this that some good soils are not over-burdened with too expensive or too extensive buildings. However, they are not so likely to be as poor soils are.

Depreciation Is Rapid

"But you ask how a farm house is appraised. Well, it is appraised for loaning purposes in connection with a loan through the Federal Farm Loan System, on a little different basis than for any other purpose. As I have already pointed out to you, these loans run for such a long time that we have to watch our step. If for any reason a farm should be handed over to us rather than operated and the installments paid promptly by the borrower, the buildings have a way of deteriorating rather rapidly. You have seen it. A farm that isn't occupied runs down hill even more rapidly than city property for the small boys are soon out with their sling-shots and stones and soon register a bull's-eye in every pane of glass on the property.

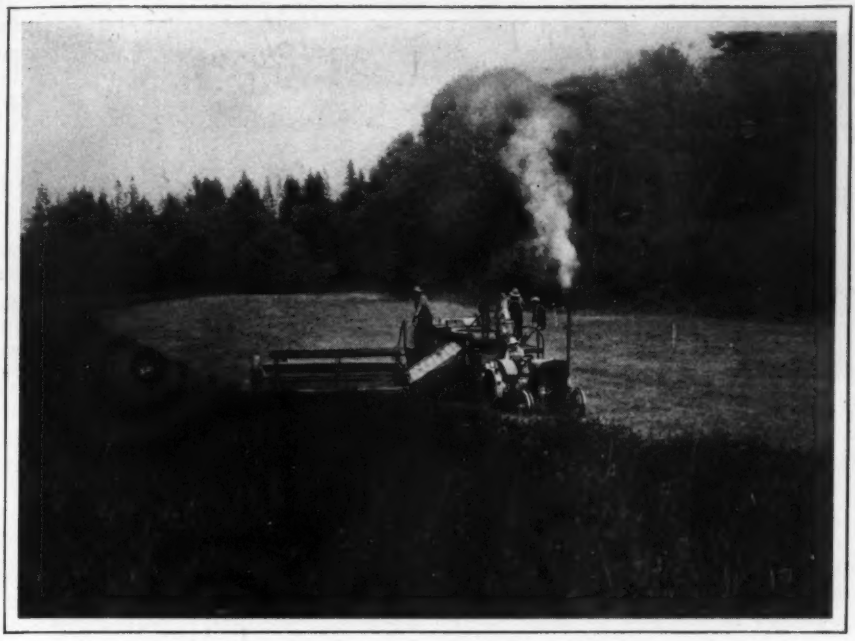
"The depreciation in the buildings, of course, is obvious to anyone, but the washing and wasting of soil on farms that are not taken care of, especially where the land is particularly susceptible to erosion, causes tremendous and disheartening loss. In some states more than half of the farms would be benefited by terracing. When the farms are actually in operation by careful owners or tenants, much erosion is stopped without terracing, but when the farm becomes vacant, washing and erosion set in in earnest. As someone has put it, loans are made on the first six inches of soil and when that washes away most of the value of the farm goes with it.

"We try to think of what is necessary in the way of buildings on the particular farm which we are appraising, keeping in mind the probable earning power of the land over a period of years. If the buildings exceed such requirements, we don't propose to lend on the excess.

"There is another angle to this which you may not have considered," further explained Secretary Jones. "A special dairy barn, a battery of silos, or a large or fancy poultry house on the ordinary farm are not considered as increasing the value of the farm to a great extent from a lending standpoint. You see we have to figure that the next person to own this farm may not be a dairyman or a poultry fancier. If that's true those buildings would not be a very great asset to him. And if they are not used and kept up, you know how quickly they would deteriorate."

"All that you say may be true," interjected farmer Smith, "but what would it cost us farmers to rebuild our homes, barns, and other outbuildings? Why it seems absurd to

(*Turn to page* 55)



Alfred Abraham, Albany, Oregon, used a combine to harvest his red clover seed crop.

Combines *for* Clover

By E. N. Bressman

Farm Crops Specialist, Oregon Agricultural College

THE past season saw the use of the combine in harvesting the red clover seed crop in western Oregon. Many fields were successfully handled in this way, and several good yields of 3 to 5 bushels per acre were obtained.

Alfred Abraham of Albany, Oregon, harvested 130 acres of red clover seed with his 12-foot combine during the past season. One day with the help of one hired hand he cut and threshed 102 bushels of red clover seed. Ordinarily it would cost $2.50 per bushel to haul the clover seed alone, or $250 for their day's labor. Mr. Abraham is very enthusiastic about the use of the combine for clover seed, and looks for a large number of combines to be used next year.

In one trip along the highway, the writer saw five combines harvesting clover seed in western Oregon. Until this past season, combining of clover was practically unheard of and only done by a few growers. The combine makes it not only easier and cheaper in handling clover seed, but also insures getting the crop harvested before rain or bad weather conditions interfere with the harvest. It will allow the red clover seed grower to expand his acreage greatly, for he will be able to take care of a larger crop.

(*Turn to page* 60)

These are some of the variety and fertilizer plots at the Ohio Agricultural Experiment Station.

OHIO

¶ *The fortieth story of our Experiment Station Series*

By W. K. Greenbank

Editor, Ohio Agricultural Experiment Station

THE fifth member of the great family of State Agricultural Experiment Stations was "born April 17, 1882, and dedicated to the interests of practical and scientific agriculture and to the vast agricultural resources of the State of Ohio."

"The location, control, general management, and oversight of the experiments and research of the Ohio Station were committed to a board of control consisting of three members appointed by the Governor of the State, the Governor, and a Director elected by the board." W. R. Lazenby, professor of horticulture in the Ohio State University, was elected first director, giving part time to the Station in addition to teaching.

The Station at first was located on the University campus at Columbus, where it was to have the use of a field of 17 acres and the privilege of conducting a few experiments in the fruit and vegetable gardens. The University also promised the use of a team and such of its farm implements and tools as might be needed, in exchange for the Station's surplus crops. The first annual appropriations were $3,000.

The receipt of the Hatch fund and larger appropriations by the State Assembly made it possible to reorganize the Station in 1888, and Charles E. Thorne was elected full-time director.

The New Home

It was soon decided to choose a new home for the Station on land better adapted to field experiments and typical of a large area of the State. A decade of experimenting on the rich second bottom land of the Olentangy River, within the city limits, had proved the location not well suited for field experiments, especially in the use of fertilizers.

Three adjacent farms, one mile south of Wooster, on the rolling upland Wooster silt loam soil, were purchased in 1892 as the new home. Per-

haps no better site could be found in the State. Two of the farms had been under cultivation for nearly a century. On one of these, the West farm, good management, including the liberal use of manure and fertilizers and the rotation of crops, had maintained fertility at a high level. The East farm, which for 25 years had been rented to new tenants every year or two, was in a low state of fertility. The South farm was newer land, a part of it still in virgin forest. The owner had fed and pastured livestock on this farm, and it was in a high state of fertility. Adjoining farms were purchased later, increasing the tract to 1,123 acres..

The Main Farm

The administration building, laboratories, greenhouses, and several other buildings are located on the West farm nearest the city of Wooster. The more uniform parts of this farm were reserved for field experiments—50 acres for the cereal variety tests in a four-year rotation of corn, oats, wheat, and clover; other areas for the "lime and floats," "grain vs. livestock farming," plant breeding, and lawn grass experiments.

The East farm contains the "five-year rotation," "barnyard manure," and "continuous corn, oats, and wheat" fertilizer experiments; the poultry plant; hog barn and lots; beef cattle feeding sheds; and the forest arboretum of some 300 species.

On the South farm are the potato—wheat—clover fertility experiment, the orchards, vineyard, vegetable and flower gardens, and one of the three forest nurseries.

The farms acquired since the original purchase contain supplementary fertilizer and lime experiments, 40 rotation experiments, numerous other experiments, and pastures.

Outlying Farms

The need of duplicating experiments on other soil types was early recognized. District farms were purchased at Strongsville, Carpenter, and Germantown and leased at Findlay in the four quarters of the State. Later nine county experiment farms were added. These farms include the principal soils in Ohio.

The first results reported by the

Former Director C. E. Thorne (left) and Director C. G. Williams (right).

Station were those of a "carefully planned and well-executed experiment in wheat culture," started three years before, 1879, by the Ohio State University at Columbus. This experiment indicates in a remarkable way the intimate association of the four directors of the Station and the continuity of its work. It was conducted by N. S. Townshend, second director, assisted by C. E. Thorne, third director and present consulting chief in agronomy; reported and interpreted by Professor Lazenby, first director; and was the genesis of the variety and plant breeding work of C. G. Williams, the present director.

The Famous Fultz Wheat

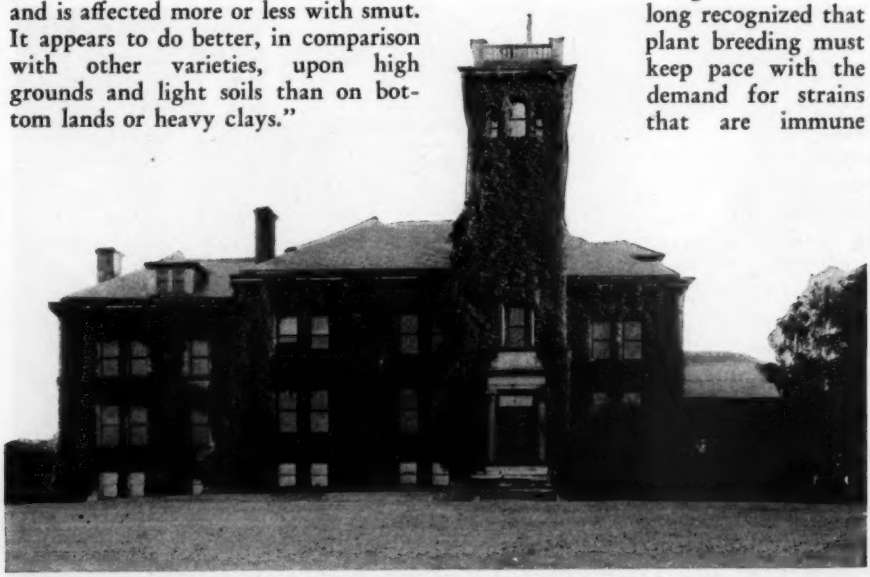
Director Lazenby's report shows the habit of growth, time of ripening, strength of straw, size of head and berry, yields, and quality of grain of 80 varieties of winter wheat. Forty-seven years ago he wrote, "Fultz wheat is the leading variety in many parts of the State. Few sorts cultivated in Ohio have given better results; it is early, has large heads, and strong straw of medium height. For the past three years it has shown a tendency to rust and is affected more or less with smut. It appears to do better, in comparison with other varieties, upon high grounds and light soils than on bottom lands or heavy clays."

Thousands of heads selected from this standard old variety have been propagated in the hope of isolating a strain with all the good qualities of the Fultz and with none of its weaknesses. Trumbull, one of these selections made in 1906, is now grown on more than half the wheat acreage in the State. It is a soft red winter wheat of excellent milling and baking qualities, such as command a premium over all other wheats; is earlier, hardier, and more productive than the parent variety; has short stiff straw; and is almost wholly immune to disease. All 80 varieties reported by Professor Lazenby, except Clawson, Fultz, Mediterranean, and Velvet Chaff, have been dropped by the Station and by Ohio farmers.

Increase Average Yield

Then the 10-year average yield of wheat in the State was 13.0 bushels per acre; now, thanks to Station varieties, better methods of culture, and the efficient use of fertilizers, the 10-year average is 16.9 bushels per acre, a definite increase of 30 per cent.

Agronomists have long recognized that plant breeding must keep pace with the demand for strains that are immune



The Administration Building, Ohio Agricultural Experiment Station.

Eighteen state experiment station directors about to inspect the Ohio Station's work.

to disease, that are winter hardy, of high quality, prolific, and strong enough to carry to full maturity heavier loads of grain. Yields of 50 bushels of wheat and of 100 of corn and oats in Ohio are not only possible but they are practical. In the Station variety field of 100 tenth-acre plots six of the old varieties—Fultz, Gypsy, Poole, Fulcaster, Nigger, and Fultzo-Mediterranean—in 1926 averaged 53 bushels per acre. Trumbull, used as a check on 24 plots, averaged 56.3 bushels, and 17 newer Station strains averaged 59.1 bushels, one of them yielding 65.9 bushels. The Station's work has added two to four million bushels to Ohio's annual wheat crop, to say nothing of its quality and of other crops.

Long-time Fertilizer Tests

Director Thorne, in starting the work at Wooster, recognized the importance of planning field experiments to continue indefinitely and to answer fundamental problems. For more than a third of a century the "Five-year Rotation" has been revealing valuable information, and the end is not yet. In this experiment the three fertilizer elements are still used separately in the four possible combinations and in different carriers as started on 150 tenth-acre plots in 1893.

A single rotation showed phosphorus to be the first limiting element on the Wooster soil. After 25 years potash became of first importance for corn, but not for the other grain crops.

The need of lime was soon apparent, and beginning in 1900 the west half of each section has been limed as it came into corn. Lime on the 50 unfertilized check plots has increased the yield of corn, oats, wheat, clover, and timothy hay 43, 60, 60, 80, and 90 per cent, respectively.

Superphosphate used alone or in combinations has not hardened the soil nor increased acidity. Five plots have received no other treatment than superphosphate, carrying 56 pounds of phosphoric acid per acre per rotation. The average yield of wheat on these plots for the first 10 years was 15.5 bushels and for the last 10 years 19.7 bushels.

Humus other than that furnished by the crop residue is not yet an important factor on this thin, well-drained silt loam soil. The average yields of plots that have received stable manure and others that have received equivalent amounts of plant food in a mixture of nitrate of soda, superphosphate, and muriate of potash with no added humus for 35 years have favored the commercial fertilizer.

Steamed bone as a carrier of phosphoric acid in comparison with superphosphate in complete fertilizers of the same analyses has fallen farther and farther behind in the race, especially on the limed plots. The last 10-year average yields of wheat on the

bone plots were 22.19 and 24.28 bushels, respectively, on limed and unlimed plots; that of the superphosphate plots, 32.71 and 24.55 bushels on limed and unlimed ends. The relative yields on the five sections for the five years were consistent. Why the big drop for the bone and lime combined? Soil biologists and chemists are seeking the answer.

Potash alone, except on corn and potatoes, has seldom returned a profit; with an adequate balance of phosphoric acid, it has seldom failed to return a good profit.

Nitrogen used with the other elements has returned fair profits over its cost. On the Wooster soil, where manure is applied or legumes grown, additional nitrogen is of doubtful value for field crops. For orchard crops nitrogen has proved of first importance.

Floats in 35 years' use at Wooster have not proved economical in comparison with superphosphate. During the same period on the Trumbull heavy clay soil at Strongsville, they have given good crop increases and have proved more profitable than lime.

Lime may be applied at any time in the rotation with about equal results after the first rotation, the proper amount depending on the degree of soil acidity. It is possible to apply more than is profitable. Eight tons per acre once in four years, after the third application, reduced the yield of corn but not of oats, wheat, and clover in the rotation.

In the supplementary experiments the equivalent of 500 pounds of a 4-16-4 fertilizer per rotation all applied on wheat gave a net increase of corn, oats, wheat, and clover of $34.13. One-third of this fertilizer applied on each of the grain crops gave $34.08; one-half on corn and one-half on wheat gave $33.72; and all on clover gave the least net profit, $26.25.

For corn 100 to 200 pounds of a high-grade complete fertilizer in the hill, applied with a drill attachment so as not to come in contact with the

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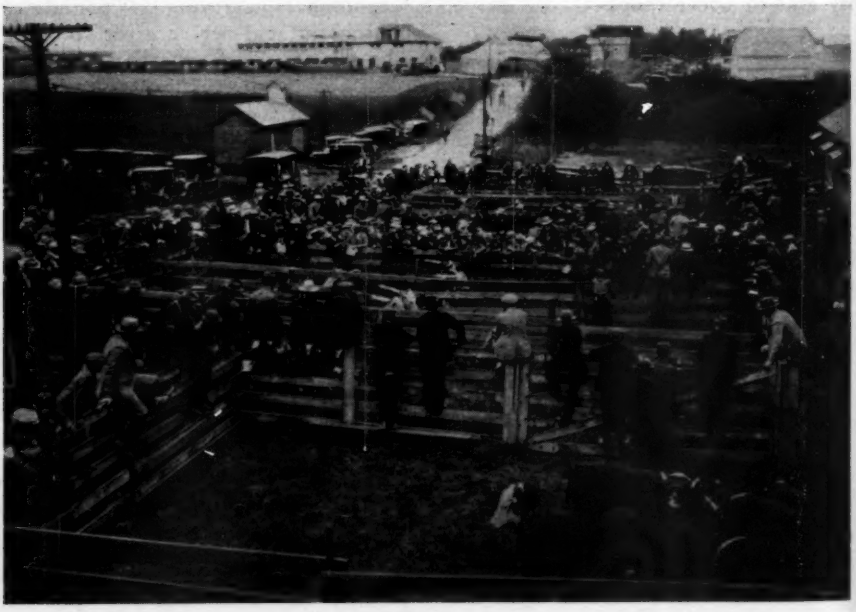

This picture was taken early in the morning of Livestock Day at the Ohio Station.

The Last Battle

By Robert Stewart

Dean, Nevada College of Agriculture

THE bacterial race in ancient times and during the middle ages nearly conquered the human race. The plagues of those times were the results of bacterial warfare against the human race. It is estimated, for example, that the Great Plague of the Orient in the sixth century killed 100,000,000 human beings. The Black Death of the fourteenth century killed nearly three-fourths of the human population of Europe. Each of these battles between the bacterial race and the human race were more disastrous than any battle between different groups of the human race recorded in history. And the egotistical human race did not even know who their enemy was or how to combat him.

The scientist has developed modern methods of sanitation whereby a reoccurrence of these near disasters for the human race is an impossibility. The bacterial race is now in subjection from which it cannot escape to do any real damage. But, while the bacterial race is in subjection, the insect race is not, and there is now being carried on a contest between the insect race and the human race that may be far more disastrous to humanity than the plagues of olden times.

The Insect Army

The outcome of this warfare is problematic. As in the recent Great War, food is the vital factor. The race which controls the food supply will win the war. The insect race at the present time is competing with the human race quite successfully for the food supply of the world. In spite of all the developments of modern science by the human race, the insect race occupies many positions of advantage in the warfare.

The insect race propagates much more rapidly than the human race and reaches the active stage of warfare in a much shorter time. The Ohio Experiment Station for example has studied the rapidity of multiplication of plant lice. A single aphid was caged on an uninfested plant. At the end of 12 days her progeny, daughters and granddaughters, totaled 76, five of whom were already producing young aphids. The rapidity of the increase from this time on can be left to the imagination or to the mathematician. One mathematician has estimated that if there were no fatalities and sufficient food were available the progeny of a single plant aphid, at the end of a single year, would produce a ball of matter the size of the earth! In the insect world, also, only the fittest reproduce and reproduce most frequently. The weak and inefficient are ruthlessly eliminated. In the human race it is just the opposite. The efficient restrict reproduction while the inefficient reproduce without restraint, and organized human society protects the offspring and regards it as a marvelous achievement of modern civilization!

The insect race is better organized for warfare than the human race and its warfare is carried on without graft. The ants are more ancient than the humans. The ants were on earth long before man. Beautiful specimens of ants are preserved in the amber of the lower Oligocene probably dating back to 20,000,000 B.C. Probably the ants will still be on earth long after man

has passed away. The ants are better organized for warfare than is man. The ant individual differs from man not only in its activity but also in its structure. As a result the ant has solved many of its social problems. The necessary work to be done is allocated to the several groups. There is no question as to who shall work, who shall fight, and who shall bear children. This is all determined before birth. The fighters are organized into squads, companies, regiments, and battalions efficiently officered. The attack is carried on in a definite, systematic, and effective manner.

The European Corn Borer

There are some dozen crops which produce the great bulk of the food supply of man. The corn crop is vital to the welfare of humanity. It produces many articles of direct use as food and furnishes a large part of the feed of livestock. The insect world is putting up a vigorous fight for the control of the corn crop.

There are many insects that use corn as food. The most insistent and vigorous of these is probably the European corn borer. The corn borer invaded this country nine years ago and came to us from Hungary. The yellow-winged moths, mothers of the borers, lay their eggs on the under side of the corn plant leaves. The eggs hatch out and borers are produced in quantity. In one infested cornfield 75 corn plants were selected at random. In one stalk alone there were 117 borers. The whole 75 stalks averaged 46 borers to the stalk. This gives one a vivid conception of the rapidity of the development of the borer and the destructiveness of its work on the corn-stalk.

The corn borer is not only diligent but is extremely hardy and resistent to efforts to destroy him. Corn-stalks covered with the brown worms have been put in a burlap sack, the whole weighted with stones and cast into an ice-cold brook. At the end of a month 81 of the 166 borers to take the ice-cold bath came out alive!

The moth mothers lay the eggs not only on the under side of the corn leaves but in the grass headlands and fence rows, any place where the eggs are protected from the direct rays of the sun. The moth mother frequently lays as many as 1,000 eggs in two weeks' time. The mother moth is extremely active and travels great distances. She is the Lindbergh of the insect world and has been known to travel more than 25 miles entirely over the water.

The borers themselves are only one-sixteenth of an inch long, but they are very active, hungry, and persistent. For three months, from July to October, they feed on the corn plant without stopping and are 16 times their original size within two months' time.

Man's Defense

The rapidity of distribution and continuous reproduction of these borers makes ordinary methods of control impossible. Spraying with arsenic is futile. The difficulty of eliminating the pest by attacks on the moth or the worm itself led to the discovery of the pest's weakest spot in its armor of defense and that is the egg stage. Efforts are now being concentrated on the destruction of the pest by destroying all places where the eggs are laid or may be laid. The result is clean culture everywhere by farmers. Old corn-stalks are destroyed. The three steps being carried on in this fight with the corn borer are: (1) Feed all corn-stalks; (2) Plough all corn stubble clean; (3) Burn all corn remnants before June 1 of each year. By following these methods of clean culture humanity has dug in for a fight with the corn borer. The advance has been checked but the fight is stalemate. The borer is still with us and is here to stay and at any time may secure the advantage in spite of our best efforts and the use of all the weapons of science.

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Two hundred pounds of muriate of potash per acre made this difference in growth and a difference in yield of 416 pounds of seed cotton per acre.

Hungry Cotton

By L. Cothern

County Agent, Morrilton, Arkansas

FRANK McNUTT, Springfield, Arkansas, has been planting cotton the past several years on a piece of land on which the cotton rusts very badly. The land is upland of the Hanceville sandy loan series. In talking the problem over with me last spring, I advised him that "rust is potash hunger" and suggested he try 100 pounds of muriate of potash as a side-dressing in addition to the 350 pounds per acre of the 10-5-4 mixture that he was planning on putting under his cotton.

"Well, you are a demonstrator, how about a demonstration," he replied. "We will put 200 pounds of that potash on an acre. If rust is potash hunger, the cotton won't starve on that acre. Come out and measure up two acres and we will see about that potash starvation."

We measured up two acres on very uniform land and to both plots we applied 350 pounds of the 10-5-4 mixture, and on one acre Mr. McNutt applied 200 pounds of muriate of potash at chopping time as a side-dressing. It was not long before a decided difference in the vigor and general health of the cotton on this acre over the cotton where potash was not applied could be seen. The picture tells the story.

The plot on the right received only 350 pounds of the 10-5-4 mixture per acre and yielded 637 pounds of seed cotton. The plot on the left received 350 pounds of the 10-5-4 mixture and the 200 pounds of muriate of potash per acre. It yielded 1,053 pounds of

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Agriculture Today

IX. The Weather

By Frank George

RECENT studies of the relation of the weather to crop yields promise a new means of forecasting production in some areas. It has been learned that much more accurate forecasts of potato production in the New England States can be made on August 1 from weather indications than is possible from crop condition reports. The probable yield of wheat in Maryland was forecast from weather factors on May 1 last year, and forecasts of potatoes and wheat have been made in Michigan based on a study of weather conditions.

A balloon and theodolite are used in making upper air soundings from which the wind direction and velocity aloft are computed.

Many State agricultural statisticians are now studying these relationships, and wherever it is found that more accurate forecasts can be made based on weather than from crop condition reports, the Federal Crop Reporting Board is planning to shift to that basis or at least to use the information as a check on forecasts made from condition reports. In some States it has as yet been found impossible to discover much relationship between weather and yield, the production being controlled apparently by other undetermined factors.

This type of research is being made possible through an accumulation of weather data running back nearly 60 years—Government weather reporting services were established in the United States in 1870—and the improvements which have been made in weather reporting and forecasting technique during the last 10 years. Ten years ago farmers received their weather information by mail, telegraph, rural telephone, and in the daily press. Today, nearly 150 radio stations over the country broadcast the weather forecasts, cold wave and other warnings, practically as soon as they are issued

by the Weather Bureau. Special hook-ups are arranged for broadcasting harvest weather forecasts, fruit spraying schedules, and marketing advice. The issuance of four reports at six-hour intervals each day instead of two reports at twelve-hour intervals is now being planned.

Heaters are lighted in orchards when advices of impending cold waves are received from the Weather Bureau.

Studies of the effect of weather on crop growth have shown that most crops have a comparatively short critical period when favorable weather will cause a large yield, and unfavorable weather a small yield, largely without regard to earlier or later conditions. Rainfall, for example, is the meteorological factor of greatest importance in varying the yield of corn, and the critical period of growth is at about the time of blossoming.

In Ohio, over a period of 60 years, the records show that an average increase of one-fourth inch in rain in July, at the critical rainfall period, caused an average increase in the yield of corn of 6,000,000 bushels, while a one-half inch increase in rain made an average increase in the yield of over 15,000,000 bushels. It was learned that the most important 30 days from a rainfall point of view in Ohio are from July 15 to August 15, while the most critical 10 days are from August 1 to 10.

On the other hand, temperature has a greater influence than rainfall in varying the yield of potatoes in Ohio. July is the critical calendar month, and it must be cool for best results. In a period of 54 years, with each average decrease of 1.6 degrees in the mean temperature for the month of July the yield of potatoes increased 6.3 bushels per acre on the average, or a total of 1,096,200 bushels.

In New Jersey, during a period of 33 years, the yield of potatoes averaged 25 bushels an acre greater when July was appreciably cooler than when it was considerably warmer than the average, a variation of over 2,000,000 bushels in yield for the State. The yield of spring wheat in North Dakota is influenced largely by the rainfall in May and June, but in general the most critical period for small grains is when the berry is in the milk or dough stage. Hot and dry weather at this time will reduce the yield of high-class seed very materially. A heavy snowfall in March is detrimental to winter wheat in northwestern Ohio, contrary to the usual opinion of the beneficial effect of a late snowfall on winter wheat.

Special Reports

The issuance of special daily and weekly reports in the cotton and grain regions during the growing season is considered by Dr. Charles F. Marvin, chief of the United States Weather Bureau, of value in counteracting the many circulated stories and rumors of weather conditions that frequently affect prices. These official reports are intended to keep farmers and others posted on prevailing weather conditions and their effect on the growth of

crops in different sections of the country. Observations are made each morning by special meteorological observers at about 400 stations in the principal agricultural regions, and the data telegraphed to central Weather Bureau stations designated district centers. Daily bulletins are published at 36 central stations, each containing weather information for the nearby substations.

In the weekly service the officials in charge of designated central Weather Bureau stations in each State collect information from many special and cooperative meteorological observers and from a large number of weather and crop correspondents in their respective States relative to prevailing weather conditions and their effect on the agricultural situation. These officials make weekly telegraphic reports to the central Weather Bureau office at Washington, where the information is tabulated and summarized and a synopsis issued for the entire country. This is released each Wednesday at 10 a.m. In addition there is published a local weather and crop summary at each State center, containing information in more detail as to conditions prevailing in the respective States.

Discussing the issuance of seasonal weather forecasts, Dr. Marvin declares that such reports will be issued as soon as scientifically accurate technique for making the forecasts is developed. Several scientific agencies, including Carnegie Institution, Smithsonian Institution, and the University of California, are at work on the problem, and some promising results have been reported, but these agencies are agreed that as yet only tentative forecasts can be made. These forecasts are being made only for checking and correcting basic data.

The New System

A new system for the interchange of daily weather reports among the 200 official observation stations in the United States was established recently by the Weather Bureau whereby commercial telegraph wires are used at any time of day instead of at fixed hours. Under the new arrangement, regular morning and evening observations from every observation station authorized to telegraph reports are sent to two main collection stations at Chicago and New York. A special organization is provided by the telegraph company at these points to receive the reports as they come in and redistribute them, by a system of rapid duplication, to such local stations as have requested the information.

Each Weather Bureau office, under the new arrangement, can be furnished with the reports best adapted to local requirements without the necessity for adjustments to the needs of other stations. For example, the report from the Abilene, Texas, station goes to 140 other stations. There are 140 blanks, already addressed, in the Abilene pigeonhole at the Chicago collection center. As soon as the report is received from Abilene, it is passed, with these blanks, to duplicators who make a stencil of the coded words and print them on the blanks. Operators of the wires connecting the Chicago office with the points of destination dispatch the messages as indicated on the blanks.

Within six minutes of the time a report is received at Chicago, the necessary duplications have been made and the messages have been dispatched to all points of delivery. Ten or more duplicators and a group of sorters and messengers are trained for and exclusively engaged on the work. Reports from nearly 200 stations can be handled at the centers in 35 minutes. This plan supersedes the so-called circuit system in effect since the establishment of the Weather Bureau in 1870.

The Weather Bureau for many years has maintained a system of cooperative weather observations whereby individuals interested in establishing an authentic history of the weather of their localities volunteer to take regular observations according to an adopted

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Hoosier farmers have community stations for treating seed wheat with hot water.

Smut-free Areas

By C. T. Gregory

Pathologist, Purdue University

THERE is no question that the hot water treatment of wheat and of barley will kill the loose smut. There is, however, considerable question as to whether it will control the stinking smut of wheat. Indeed, I am prepared to say that the hot water treatment will not control "bunt" under all conditions. So certain am I of failure that I have ceased to recommend it for this purpose. The hot water will not penetrate to the center of the greasy spore mass of the smut balls. Subsequent rough handling will break these smut balls, heavily inoculating the seed. I have seen 12 per cent of stinking smut in properly hot water treated wheat. I say properly because the loose smut was eradicated.

Keeping loose smut out of wheat is a far different question than killing the smut. Ten years of experience in Indiana has shown us the grave difficulties that stand in the way of this ideal,—controlling loose smut. The serious drawback is the blowing of the smut spores. We have no definite proof of the exact distance the spores are commonly spread by the wind, but we have good evidence that a loose smut contaminated field a mile away from a clean field will cause reinfection.

We were brought face to face with this problem in our certification of wheat. Our tolerance of loose smut in Indiana is only a half per cent and no seed gets by if it has more. Naturally one would expect that such seed ought to produce a relatively smut-free crop next year. Ordinarily, our expectations are fulfilled, but in a few cases there has been more smut in fields planted with certified seed than in the home-grown wheat. And the farmers wanted to know "How come?" We

traced some of this certified wheat back to its source. There was no question that at the time of its inspection it had less than one-half per cent of smut in it. The grower was not crooked; he had not sold poor seed wheat for certified. What we found was that the offending seed had been grown in a locality where loose smut was serious and where no concerted community effort was made to eradicate the disease. The spores had blown in from neighboring fields and had contaminated our certified wheat.

That is the problem. What can be done to prevent reinfection of the treated and clean wheat? As a matter of fact, that is just the question that many Indiana wheat growers have been asking us for the past several years. They are absolutely convinced that the hot water treatment will control the loose smut. But said they, "We can't treat enough seed for our entire acreage each year. If our neighbors do not treat their wheat, the smut will blow from their fields to mine."

Community Stations

What is the answer? Is it community treating stations? Perhaps so, but we have had as many as 20 such stations in operation in Indiana at one time. We have had over a thousand farmers treating anywhere from 10 to 50 bushels each, but still it did not work to our complete satisfaction. We made it easy to treat the wheat, cutting down the labor to minimum. Large tanks of water heated by steam were used, and by the way, this is the easiest means of maintaining the temperature of the water. We eliminated any predipping in water at 120° F., but we could not eliminate the presoaking of four hours. This, the farmers did, bringing the wheat to the station already soaked and ready to treat. With eight men treating their seed at one time around the tank, we could treat from 30 to 40 bushels an hour.

Just a few tips on this method may help others. In the first place, never let a farmer put more than a half bushel of wheat in a sack. It will swell to the volume of a bushel. Do not use anything but burlap or at least, loosely woven bags. Grain sacks are not satisfactory. Let the farmer presoak the wheat and bring it to the treating station. It will do no harm to soak the wheat early in the morning and then treat it late in the afternoon. But do not let the wheat remain wet in the sack over night, since it will sprout and will be more easily injured. It is not necessary to heat the water at exactly 129° F. We usually hold the temperature at 130° during the treatment. A temperature of 135° for 10 minutes will do no harm. After the first minute of thoroughly shaking the sacks of wheat in the water, it is not necessary to move them. Once the hot water has heated the center of the half bushel of wheat, the temperature will not fall.

But to get back to my story of keeping loose smut out of wheat. After every method failed, we have at last hit upon a method that looks successful. It consists in establishing smut-free areas. It cannot be accomplished in all regions, perhaps, since the first requisite is a more or less isolated area. This may mean a hilly region such as is found in Dubois county, Indiana. Here the wheat areas are in valleys shut off from other areas by high hills. I have found that wheat treated eight years ago in this region is still free from loose smut, a natural smut-free area. Another type of area is like the one established last year around Hillisburg in Clinton county. Here the country is flat, but there is an area of about four square miles where wheat is grown intensively but for at least a mile on all sides little is grown.

In this area, eight farmers cooperated three years ago in treating seed for a seed plot and then each of them used the wheat from this plot. They

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Crop Associations

By P. H. Stewart

Secretary, International Crop Improvement Association, Lincoln, Nebraska

STATE crop improvement associations which are now in operation in nearly 30 states and in a number of Canadian provinces are doing much to improve cropping practices. These associations act as a connecting link between agricultural colleges and individual farmers. Probably their greatest work is in the certification and distribution of pure seed of improved crop varieties developed and recommended by agricultural experiment stations. Without these associations the distribution of new and desirable varieties of crops would be indeed a slow and uncertain process.

The general plan under which crop improvement associations function is about like this: experiment stations from time to time are finding by careful tests varieties of crops which are superior to those commonly grown. These new varieties may be the results of crosses, of selections from common varieties, or newly imported ones which in trials have proven their unquestioned superiority. This superiority may be due to better yields, greater hardiness, better straw as to lodging, disease resistance, quality, or other important qualifications.

Experiment stations for the most part do not have facilities for producing large amounts of foundation seed stocks for general distribution to farmers. However, through cooperation with crop improvement associations a supply of pure reliable seed may be quickly built. This is accomplished by the crop improvement association putting foundation seed stock from agricultural colleges into the hands of a few proven growers whose inclination and ability to produce pure seed have been proven. The crop grown by these careful farmers is then inspected rigidly before harvest and again when threshed and if satisfactory is certified and offered to the public at a fair price. By a simple yet efficient system of inspections, records, and reports, the seed supply is followed from farmer to farmer in such a way that soon good pure seed of the crop is available in all parts of the state where it is adapted.

Good Crops Spread

In Kansas, for instance, Kanota oats a variety yielding from 5 to 10 bushels per acre more than commonly grown varieties is now the leading oat variety occupying some 1,500,000 acres in 1927. This is a remarkable acreage when one considers that it was first distributed to a few farmers by the Kansas Agricultural College in 1921. In 1921 the Kansas Crop Improvement Association certified 10,000 bushels of Kanota oats; in 1922, 56,000 bushels; in 1923, 166,000 bushels; in 1924, 106,000; and in 1925, 100,000 bushels. In 1924 census figures showed 42 per cent of the Kansas oat acreage to be in Kanota oats. The availability of seed in all parts of the state through seed certification work was largely responsible for the rapid spread of this good variety.

In Nebraska in 1927 Comfort barley was first distributed to Nebraska farmers, by the Nebraska Agricultural College. Comfort barley is a bearded variety having the general appearance of common six-rowed barley but the

beards are smooth, that is, they do not have the rough saw-toothed edges or barbs which make ordinary barley so unpleasant and unpopular to handle. The acreage of barley in corn belt states has to quite an extent been held down because farmers dislike to handle the high-yielding but rough bearded varieties of this crop. Barley, however, compared to oats as a feed crop on the farm which is the main use of the two crops, makes a higher yield per acre of hull-free grain and it seems that more should be grown in place of oats. Comfort and other smooth varieties promise to bring about an increased barley acreage. In Nebraska in 1927 a total of 440 bushels of Comfort barley was certified by the Nebraska Crop Growers' Association. In 1928, 7,925 bushels were listed on the certified list and in 1929 it is expected that pure, good quality, true-to-name Comfort barley can be bought in most barley growing communities of the state.

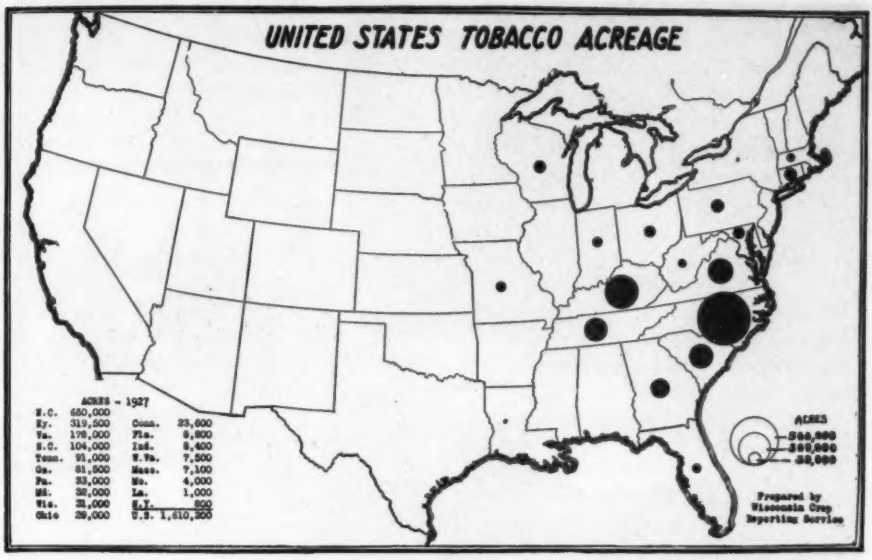
In Michigan, which is an important bean growing state, a similar rapid distribution of Robust beans has been brought about through crop improvement work. In 1918 the first seed stock of Robust beans, a disease resistant white navy variety was distributed by the Michigan Agricultural College. In 1928, just 10 years later 60 per cent of Michigan's bean acreage was planted to the Robust variety.

Check Poor Varieties

Because of the close cooperation between crop improvement associations and agricultural colleges it is possible to discourage the use and spread of undesirable but often much over advertised varieties and specialties. Before any certain crop variety is certified, it must be recommended by agricultural college workers, one or more of whom is usually on the committee to decide what varieties are to be certified. This tends to reduce the number of varieties grown in a state and brings about crop standardization. This is a very valuable thing as most communities would be benefited by a reduction in the number of crop varieties grown. Mixing, marketing, and milling problems would be simplified if fewer varieties and types of crops were produced.

Probably alfalfa has felt the influence of crop improvement association activities more than any other single crop. This is particularly true in the northern alfalfa growing sections where a hardy type of alfalfa is essential. Grimm alfalfa particularly is desired by northern farmers. A few years ago the buyer of Grimm alfalfa was gambling when he bought seed. It might or might not be true Grimm. Now, however, due to the activities of crop improvement associations in tracing the history of fields, in inspecting sealing, and otherwise checking on seed as to variety, quality, and origin, the Grimm seed buyer can feel quite sure that seed carrying a crop improvement association tag is the real Grimm. Northern seedsmen recognize the value of certified Grimm and for the most part handle it for their customers. The availability of reliable seed supplies of Grimm has done much to greatly increase the alfalfa acreage in such states as Minnesota, Wisconsin, Michigan, and others. Seed certification work removed the doubt as to genuineness of variety.

Other activities of crop improvement associations are the conducting of yield contests, the fostering of the international grain and hay show and general educational work on good farm practices in crop production. "Good seed is the foundation of a good crop" has been preached. But more productive of results than mere preaching has been the certification work in making available to the average farmer, at prices he could afford to pay, good seed of the highest yielding standard varieties as recommended by state and federal experiment stations.



TOBACCO

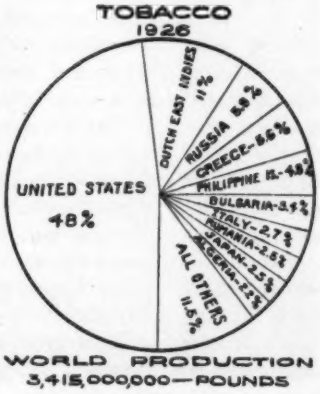
¶ *Ninth of this series*

By Walter H. Ebling

Agricultural Statistician, Wisconsin

TOBACCO is another crop of American origin which, like corn, was used by the natives of the American continent and the West Indies at the time when the early explorers first visited them. The culture of tobacco among the Indians was common and it was from them that the white men learned it. The crop became commercially important at the Jamestown Colony where it was an important article of export as early as 1612. It has continued to be an important agricultural cash crop in the United States for the United States is the world's largest tobacco grower and the bulk of the acreage is located in the eastern half of the country, quite largely in the Atlantic Seaboard States.

The early strains of tobacco grown in the American Colonies were probably introduced from the West Indies or South America, and these as well as the ones commonly grown by the native Indians were later introduced into the Oriental countries, Europe, the interior of North America, and elsewhere. The crop now is grown to some extent in nearly all parts of the world, though the United States has always led



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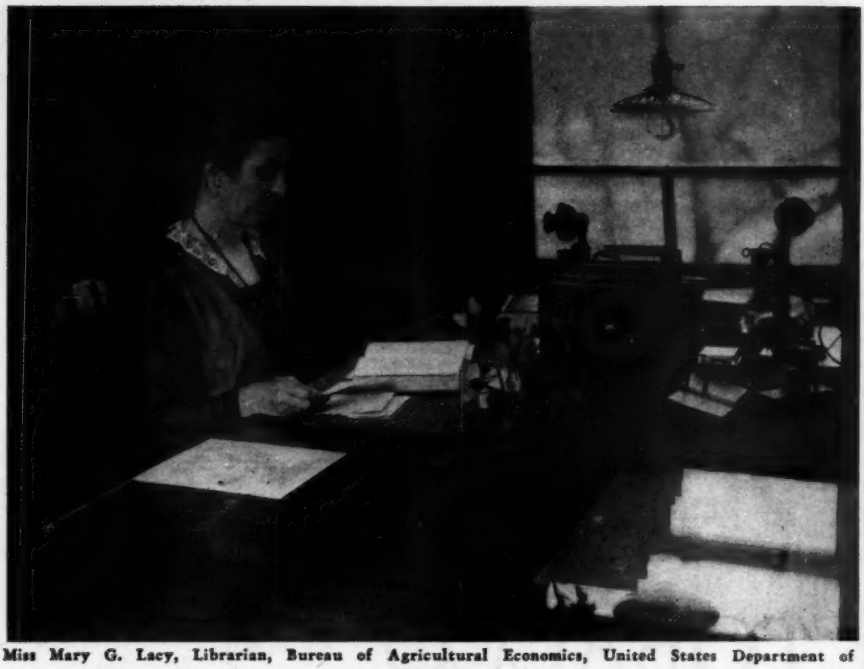


Miss Mary G. Lacy, Librarian, Bureau of Agricultural Economics, United States Department of Agriculture.

Keeping-up *with* Facts

By C. B. Sherman

United States Department of Agriculture, Washington, D. C.

DEMAND for economic information is more pressing among agricultural workers today than ever before. As the task of disposing of a good crop profitably after it is produced becomes more perplexing than the raising of a bumper crop, farmers and their leaders are increasingly interested in records of past crops, records of past prices, reasons for variations, disposal of surpluses, and all those kindred subjects now so much to the fore. To the experienced student records of the past, with interpretations, constitute a valuable indication of agricultural trends of the future, and farmers and their leaders are now thinking more and more in terms of the future.

The leader of today is fully alive to the fact that a wealth of such data is being made available, but the very abundance of it causes him confusion. He wants to know how to get a line on it now and how to keep a line on it as the months go by.

The librarian of the Bureau of Agricultural Economics, Miss Mary G Lacy, is seeking to provide just such clues, not only to the workers of the Bureau but to agricultural workers everywhere. Having served in two State agricultural libraries as well as in the library of the Department of Agriculture, and as secretary of the Agricultural Libraries Section of the

American Library Association, she knows local and Extension needs and keeps them constantly in mind.

As a result, her library staff has made available our most comprehensive and valuable reading lists on the crucial economic problems of the day. Control of agricultural production, government control of export and import in foreign countries, bounties on agricultural products, and price fixing by governments, 424 B. C.—1926 A. D., form a group of extensive timely bibliographies that have been in demand not only here but in many foreign countries. Each includes many hundreds of titles and every publication represented has been personally examined to determine its fitness for entry. Another very timely list is on taxation and the farmer. An earlier extensive bibliography on marketing farm products is probably the best known and most widely used. Other less extensive lists cover such concrete subjects as the peach industry, the apple industry, the poultry industry; and such abstract subjects as price spreads and factors affecting prices. And any of these lists may be had by any worker who shows a need for them.

A county agent receives "Agricultural Economics Literature."

Another type of work which is being conducted with the cooperation of the States involved is the indexing of the State official sources of agricultural statistics. Such indexes have been finished for Alabama and Oklahoma and the one for California is almost completed. These indexes bring together the statistical information needed as a base for a sound, long-time plan for the agriculture of a given State, and have a multitude of lesser, short-time uses.

Once a man has used one of the extensive bibliographies as a guide in his study or reading on a certain problem, and has thus informed himself as to the best that has been written on the subject, how is he to keep up to date thereafter? Miss

(*Turn to page 52*)

Oklahoma Needs Alfalfa

By H. F. Murphy

Soils Specialist, Oklahoma Agricultural Experiment Station

OKLAHOMA is growing only a small acreage of legume crops. There are several reasons for this and many reasons why the acreage should be increased.

In the first place, the soils are relatively new and have been fairly productive of crops that bring a good cash income. The last five years show that the average field crop valuation has been more than $290,000,000 annually. The outstanding crop in value has been cotton which has contributed as an average more than $120,000,000 each year. It is the principal crop in the southern half of the State and is forging its way well into the northern half. Wheat is second crop of importance. Revenue from this crop brings to the farmers of the western half of the State approximately $59,000,000 each year. Corn ranks third in importance bringing in a little less than does wheat. The sorghums are a poor fourth, yet where they are grown they are a vital factor in the agriculture of the section. Their average annual value for the last five years has been approximately $15,500,000. With such crops as these and with the relatively new soils, farmers have not considered legume crops to a great extent.

Time for Legumes

The time is at hand, however, when legume crops are to be more seriously considered. The soils of the State are no longer virgin, and have declined in yield since first being put under cultivation. Considerable agitation is now in progress tending to increase the legume acreage. Better soils conferences are being held in a large number of counties, and one of the objects of these conferences is the stimulation of a larger legume acreage. Soybeans, cowpeas, mung beans, sweet clover, alfalfa, and some legumes of minor importance are being considered.

Alfalfa offers the best chance of any of the legumes to show an immediate cash return. It has been grown profitably on the better lands, especially the rich bottom soils, but not a great deal on the medium to better uplands. Where untreated uplands have been devoted to alfalfa, the yield has not been considered very successful as measured by the returns from the cash crops of the community.

There is a large acreage of uplands in this State, however, that so far as moisture is concerned, are suitable for the growing of this crop, but yet due to the lack of plant food, alfalfa does not do as well on them as it should. Fertilizer tests are now being conducted on some of these soils and some of the fertilized areas are showing up exceptionally well. In most places, farm manure reinforced with superphosphate is giving excellent returns.

Of course, not enough farm manure is available for the needs of the average farmer and so it is necessary to resort to commercial fertilizers. For the last two years, a 200-pound yearly application of a 12-2-6 (PNK) fertilizer increased the yield of alfalfa on the experiment station farm at Stillwater 2,537 pounds per acre annually. After deducting the cost of the fertilizer and calculating the alfalfa hay at $15 per ton, the yearly net gain for the treatment was $15.02 per acre.

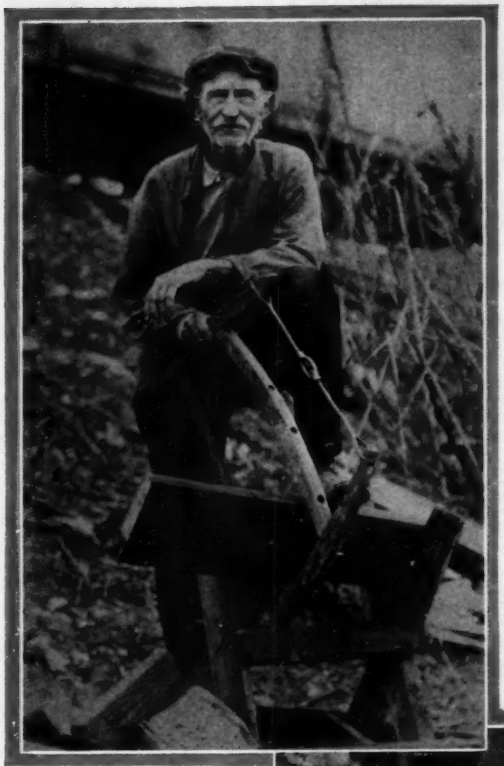
1871 **Robert Kunze** 1929

THE sudden death of Robert Kunze on July 29, 1929, at Bad Reichenhall, Germany, has taken from the agricultural industry a man widely known and respected for his untiring zeal and integrity. For more than thirty years actively identified with the European potash interests, Mr. Kunze's valuable experience and clear vision played an important part in the growth and stabilization of the production and world distribution of potash, so essential to agriculture.

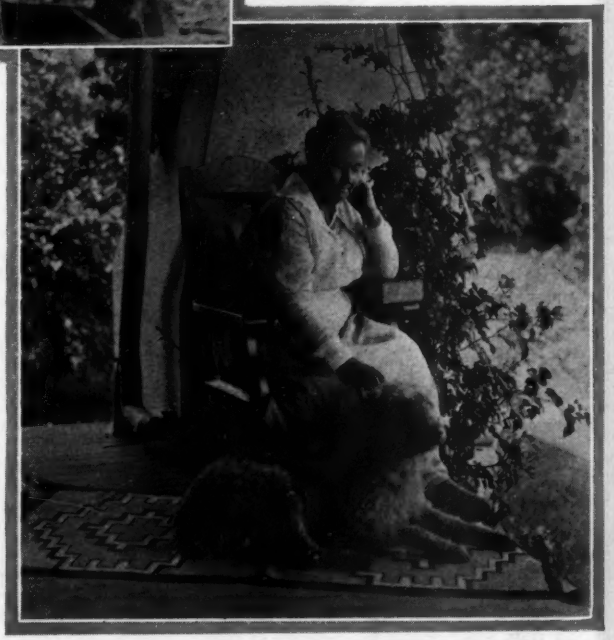
Mr. Kunze was born in Saxony, August 31, 1871. He received his early commercial training in London with a large importing and exporting house, after which he became associated with the textile industry in Saxony. In the late nineties he became allied with the German potash industry, which was then in its infancy. Later as a director, he saw this industry grow to world-wide proportions, and he was a distinct factor in its post-war development.

In March, 1927, Mr. Kunze became associated with the N. V. Potash Export My. of Amsterdam, Holland, as co-manager of its New York office. He sailed from New York on June 18 on business and in the interest of his health which had become impaired in the unselfish giving of his strength and energy to the demands of his position.

Mr. Kunze's wide circle of friends and associates mourn the loss of a personality whose charm and ever-ready kindliness had endeared him to all who knew him. Even in the press of his duties, he never lost touch with the humanistic side of life, a trait which makes his memory so greatly beloved and respected.

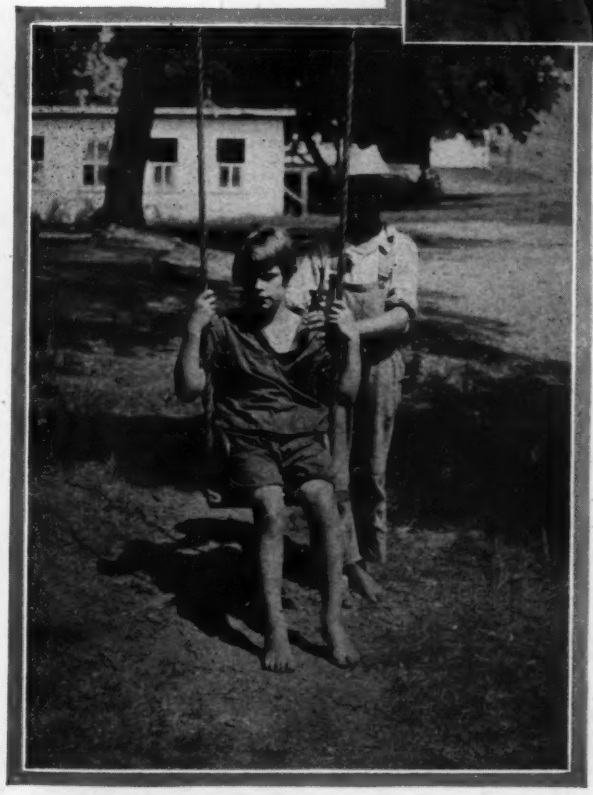


Left: "The Pioneer's Golf." Going out after supper and bucking-up a little wood for the breakfast fire was good exercise and helped keep many a man fit for a good old age.



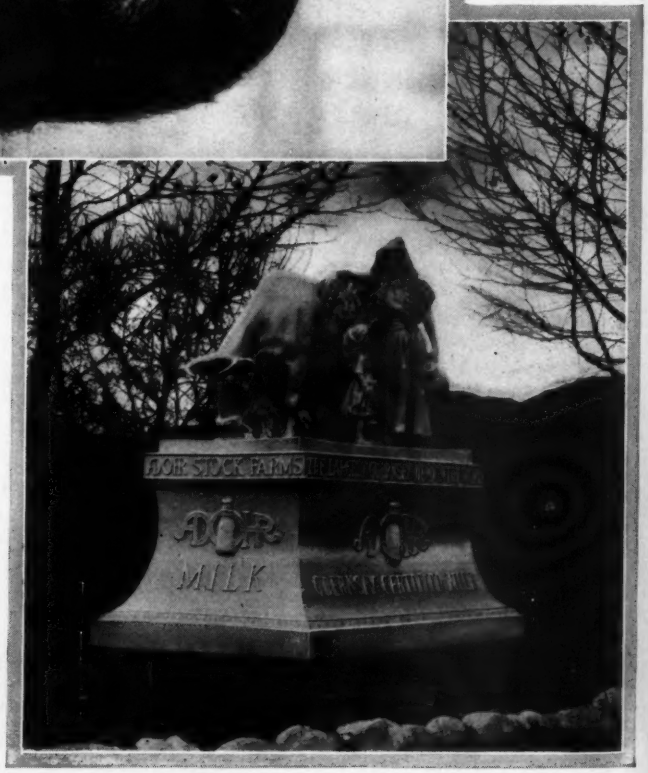
Right: The afternoon "sit-a-while," with old Towser for company.

Right: "There are no tummy-aches in this hat," said Charles Jeter Glenn, after picking these fine, ripe apples from the orchard of his uncle, J. B. Douthit, Jr., of Pendleton, South Carolina.



Left: No farm is complete without a good swing of this type for the boys and girls.

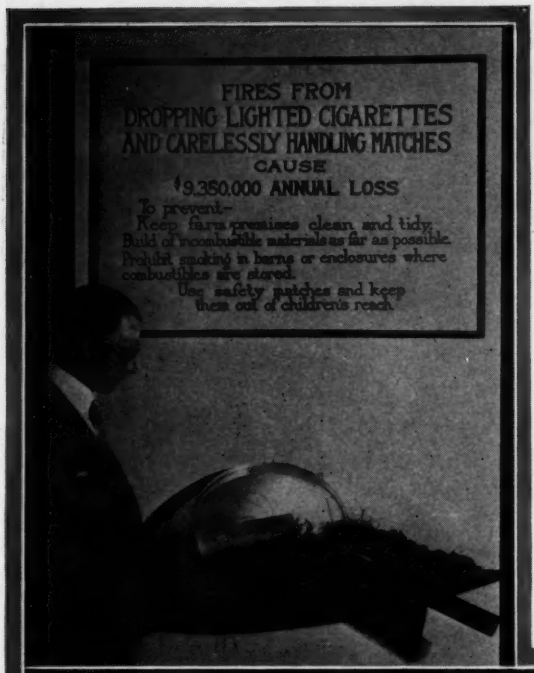
Left: A porcine king ready to defend his laurels on the fall show circuit.



Right: This piece of statuary near Los Angeles is a unique way used by a producer in calling the public's attention to his quality product.

Right: Helping Daddy shock wheat is hot work, wherein the jug comes in handy.

Left: This pig seems to be enjoying the bath which his youthful owner is giving him in preparation for his entry in a 4-H pig show.


FIRES FROM
DROPPING LIGHTED CIGARETTES
AND CARELESSLY HANDLING MATCHES
CAUSE
$9,350,000 ANNUAL LOSS
To prevent:-
Keep farm premises clean and tidy.
Build of incombustible materials as far as possible.
Prohibit smoking in barns or enclosures where
combustibles are stored.
Use safety matches and keep
them out of children's reach.

Left: A photograph of an enlarged cigarette butt used in an exhibit by the United States Department of Agriculture to emphasize the danger of fires from this source.

Below: President Hoover and the Farm Board. Top row, left to right: William Frank Schilling, Charles Scoon Wilson, Carl Williams, Cuthbert B. Denman. Lower row, left to right: James Clinton Stone, Secretary of Agriculture Arthur M. Hyde, President Hoover, Alexander Legge, and Charles C. Teague.

The Editors Talk

Standardizing Experiments

One of the most outstanding needs of the American farmer today is more definite information concerning the plant food requirements of his crops. There are plenty of recommendations, and it is this very fact that lends confusion to the farmer in deciding which is the best for his particular farming conditions.

This being true, the most important work that can be done by the experiment stations which play so large a part in solving our many soil problems is the testing of the various soil types of the nation to determine their exact requirements for added plant food. Experience has proved that such tests are the only means of getting this information, and it is remarkable the extent to which farmers have recently adopted the recommendations of experiment stations where such recommendations are based on tests thus made.

Not many years ago, each experiment station was a unit unto itself in making such tests, the result being that the farmers and the fertilizer men were more confused than otherwise in attempting to follow them. There was no uniformity in the work done, and no comparisons possible over even a single state. Recently the tendency, at least in certain states, has been to have simple or uniform tests conducted by each station doing work on the main soil types, not only at the stations themselves but on similar soils scattered widely over each formation.

In a single state these uniform tests varying one element at a time with the other two supplied in ample quantity have resulted in such definite information that the problem of getting the farmers to adopt the recommendations and the manufacturers to prepare the mixtures has been a simple matter.

There is no more important problem today than that of having our experiment stations over the country as a whole, and particularly over the South, adopt some uniform plan of conducting these fertilizer tests, so that when the results are obtained they may be easily compared. At least such uniform tests should be conducted with the standard crops on the main soil divisions of the country as a whole. For instance, it would be worth an untold amount for the cotton farmers from North Carolina to Texas to be able to know how much fertilizer and what analysis would likely prove most profitable under their peculiar soil and climatic conditions, and to be able to compare the effects of the same analyses used in the same way over this wide stretch of cotton country.

The farmers are entitled to such information for they already are spending millions upon millions of dollars annually for fertilizers that in the main are being used in a most haphazard way. More definite information would be a boon not only to these farmers and to the consumers, but to the manufacturers and dealers in fertilizers.

A movement to bring about this uniformity of fertilizer tests already has been started in several states. It cannot be brought about too soon.

"Do We Need More Farm Land?

The recent publication of an address by Dr. O. E. Baker, Senior Agricultural Economist, Division of Land Economics, United States Department of Agriculture, given at an Agricultural Extension Conference at the University of Minnesota, contains some facts and conclusions which are of exceptional interest. We who have been wondering about agricultural production, consumption, population, and other factors which will determine the future of our agricultural industry, will find that Dr. Baker has as keen an insight, on what is to happen in the next ten years at least, as can be found anywhere.

In considering the changes in agricultural production since The World War, as a basis of what to expect, Dr. Baker compared the five-year period 1917-1921 with the period 1922-1926. He found an aggregate increase in agricultural production of 13.5 per cent, that is, population increased from 100 to 108, agricultural production from 100 to 113.5. The increase in production per capita was, therefore, about 5 per cent.

During the Twentieth Century the important changes in consumption have been a decrease in the per capita consumption of cereal foods and an increase in sugar, vegetables, and pork. In general this shift is toward those foods which can be produced in large quantities per acre.

Dr. Baker brings out the fact that the prospects are for a stationary population by the year 2000.

From these facts—the increase in production, change in food habits, and the prospects for a stationary population—it is concluded that the probability of a necessary increase in the acreage of farm lands is limited.

In addition during the next ten years the shift from the use of horses and mules to tractors will continue, releasing more farm land for food crops. The application of science and invention to agriculture appears to be advancing at an accelerating rate, according to Dr. Baker. Nearly all of these improvements promote agricultural production. During the past decade they have provided more food and better food for the increasing population without any increase in crop acreage.

We will not need more land, but what we will need, Dr. Baker says, is a finer classification and utilization of the agricultural acreage which we now have.

The City Farmers

America's largest city is to have its own agricultural fair. The American Institute of the City of New York is announcing its second Children's Fair to be held in October at the American Museum of Natural History.

It is worthy of note that the active interest in agriculture on the part of the children of New York is such that a real agricultural fair can be held. Prizes totaling more than $3,000 will be offered by the Institute for the best displays of work in agriculture, gardening, nature study, conservation, astronomy, geology, physics, and chemistry. All school children 18 years old or under residing in any of the five boroughs of New York City are eligible to enter exhibits.

Last year's fair attracted 3,000 exhibitors, of whom more than 1,000

entered displays of their work in agriculture. The judges considered some of the exhibits better than many to be found at state fairs. Nearly 37,000 people attended the exposition, and a much larger attendance is expected this fall.

The fair, according to L. W. Hutchins, director of the Institute, is designed to focus attention on the sciences and to foster a scientific interest in agriculture, gardening, nature study, and conservation.

Regarding Tourists

We are in the midst of the big tourist season. Just what this means to the different sections of the country is difficult to estimate. From time to time, we see published figures which are startling in their import. Canada has just issued a statement to the effect that tourists from the United States and other countries spent more than 250 million dollars in Canada last year. Various checks are being kept in the United States and some of these figures when published will seem almost unbelievable.

The tourist trade which has developed with the automobile has assumed a great industrial importance. Added to the monetary benefits derived in entertaining visitors, there has sprung up in communities a natural pride in making most attractive the points of interest which they can offer. Evidence of the realization of the value of the tourist trade is seen everywhere in large sums spent on highways, camps, and in advertising.

While we may feel that we are not directly benefited, it does not take much speculation to see the effect of this increasing number of visitors upon our community. We cannot be blind to a feeling of pride that outsiders are interested in our surroundings. This is a healthy stimulation to our social and economic life which should be welcomed generally. Let us do what we can to encourage tourist trade.

The Farm Board on the Air

Secretary of Agriculture Arthur M. Hyde has inaugurated a new farm radio hour. We are pleased to note that among other important subjects which will go to make up this program, the actions of the new Farm Board will be given.

Interest in every move of the Board is rife and all "agricultural eyes" are turned on it. Now it will be possible for all ears to be opened to listen for advices and decisions from this group of experienced men who have undertaken the solving of agriculture's difficulty.

"We aim to give you in these daily broadcasts the day-to-day agricultural facts with only such interpretation as will make them of the most practical value," said Secretary Hyde. "The problems that confront agriculture are real problems—taxation, land policy, farm credit, freight rates, roads, waterway development, cooperative marketing, and agricultural surpluses. They

can be solved only on the real basis and in harmony with the economic laws which control prices.

The American people are now embarking upon a new enterprise—the organization of agriculture for self-help. For its success, every individual, whether farmer or not, must know why the action of the new Farm Board is taken. Therefore, the department will try to keep the public, both urban and rural, informed. A clear understanding of the problems of farming is vital in showing the national necessity for solving them."

Secretary Hyde concluded his remarks by saying, "The Department of Agriculture does not intend to try to run your business. We intend merely to place the facts before you for your reasoned decision."

When Cows Walk—

Back in the days of '49, a 1,200 mile westward trek of a little milch cow trailing along behind a covered wagon would have occasioned no comment. But in this, the motor age, the "hike" of two Ayrshire cows from Brandon, Vermont, to the National Dairy Exposition to be held in St. Louis, Missouri, on October 12, is giving rise to more publicity than even the directors of the breed association anticipated.

Tomboy and Alice, the two pedigreed red-and-whites, are patiently doing about twelve miles a day, catching their cuds along the roadside, and filling the pails at milking time, to make probably the first "long-distance" record in the dairy world. They already have passed through many New York State towns where they were the center of admiring and wondering groups. They are being directed by two attendants in white suits, who are using a motor "chuck" house as their dairy, advertising office, and headquarters.

The cows are on official test. It is probable that whatever record they make will help to further prove the hardiness and stamina of the Ayrshire. We hope the cows do well, and that they won't have to walk home.

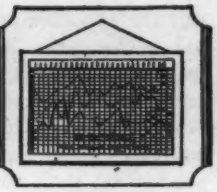
Alumni Picnics

The agricultural alumni of Purdue University, Lafayette, Indiana, have a novel way of keeping in touch with one another. This summer a series of eight picnics were planned in as many districts throughout the State, to which invitations were extended not only to the agricultural alumni and former students in the vicinity, but to the general alumni faculty, and students of the entire university.

Enjoyable programs were worked out by the committee, and each picnic was designed to be a gala reunion for Purdue alumni, with a fried-chicken basket dinner the big feature of the day. Prizes were provided for competitions, which included baseball, swimming, fishing, horseshoe pitching, along with many impromptu stunts. Dean J. H. Skinner of the Purdue School of Agriculture and director of the Agricultural Experiment Station, as well as many other prominent members of the faculty, attended several of the picnics.

Such get-togethers ably serve to promote a common interest in a community and are a big help in fostering the germ of cooperation. Other agricultural colleges might well consider the regional alumni picnic.

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

CUT CEDARS THREE MILES FROM APPLES

Apple trees will not remain free of rust if grown less than three miles from cedar trees. This has been shown through experiments by Dr. M. J. Giddings of the College of Agriculture, University of West Virginia. The rust gradually dies out after the elimination of the cedars. In check regions nearby the disease remained highly prevalent. The distance the rust spores are carried depends to a considerable extent upon prevailing winds and upon the number of cedar trees. Spores are carried farther from trees on hills. Apple trees are most susceptible to rust infection during a lull in a rain or immediately after a rain when the temperature is between 60 and 70 degrees.

MINERALS FOR STEERS

Minerals have long been recommended for hogs, and now comes John M. Evvard, well-known experimentalist of Iowa State College, Ames, with the assertion that he and his associates have found steers getting minerals do much better than those without. A mixture of bonemeal, limestone, and potassium iodide has increased the price from four to five dollars per steer in every instance, even though each steer received only an ounce of the mineral mixture daily. This addition to the ration has paid even when the ration was exceptionally good. Legume hay was fed in all cases, but even good alfalfa as the sole roughage did not remove all the advantage of mineral feeding. This year the work was varied somewhat and in one case bonemeal alone was added, in another bonemeal and limestone, and another bonemeal and limestone with potassium iodide. Also, in one lot baking soda was added to the three-part mixture fed; in another iron oxide or common rust was added; and in another copper-carrying compounds; and in still another kelp or seaweed. Reports to date show that the steers getting the iron oxide in their ration look exceptionally good.

FARM LIKE FACTORY

American agriculture is rapidly going onto an industrial basis and is now undergoing a revolution as important in its way as the industrial revolution in America, said Dr. Henry G. Knight, chief of the Bureau of Chemistry and Soils, before the Institute of Public Affairs and Foreign Relations, in session recently at the University of Georgia. He spoke of painful adjustments in agriculture, but predicted an inevitable trend toward a brighter future for the American farmer. Speaking of soils, he said: Soil erosion is chief among liabilities of Georgia farmers. He outlined the nation-wide program of soil erosion prevention for which Congress has appropriated $160,000 and pointed out that the decrease of 5,000,000 acres in Georgia's cultivated farm land since 1910 and the increase from $71 to $100 per farm expended for fertilizer since that time are due in part to the loss of the fertile topsoil

and the exposure of vast areas of subsoil. The time has come to select special soils for special crops and to recognize the fact that Georgia and other states of the Southeast cannot compete on an equal basis in cotton production with the newer level lands and farm machinery of the Southwest, except by growing higher grade, long staple cotton and that only upon those types of soil to which cotton is best adapted.

ROUGE FOR TOMATOES

Tomatoes are not blushing so well as formerly, or at least they are not blushing well enough to suit the market. But Dr. R. H. Harvey, agricultural botanist of University Farm, St. Paul, Minnesota, has come to the rescue with a process on which he has been granted a patent. He uses ethylene gas. All that is needed is a suitable room and a tank of the gas equipped with a simple flow meter. The gas treatment amounts to about 40 cents to $1.00 a carload. Ethylene gas is inflammable in high concentrations, but there is no danger if fire is kept away from the tank while the gas is being liberated in the room. The dilution in which it is used on tomatoes is many times beyond the combustion point.

IMITATION CHINESE

The Caucasian may now easily and quickly acquire an Oriental complexion. All that is necessary is to keep up a strong appetite for carrots. The American Medical Association received a report of a person thought suffering from jaundice who was found to have eaten a large bowl of carrots every day for three months. The coloration is said to be harmless and the carotinemia disappears rapidly when carotin-containing foods are removed from the diet.

Perhaps a strong ration of carrots and almonds would turn out a good imitation Chinese.

AXE INSTEAD OF WORM

Illinois poultry flocks are suffering from the axe, says the poultry extension specialist of the College of Agriculture. The spring cockerels that grow the fastest, he says, are usually the ones that are sold. They are killed as broilers because they are the first ones in marketable condition. This is a bad practice, says the specialist, because these vigorous birds should be kept for breeding purposes. The slower developers literally save their necks by being some distance back from the head.

HOLD IT!

Nowadays everyone is looking for new ideas to use in carrying on the fight against soil erosion. The importance of the problem is getting, at least in a measure, the attention it deserves. Suggestions are coming from all directions, and the result will be less mud in the Mississippi and all other streams. Oklahoma brings up Bermuda grass as the best for permanent erosion control in that state, and no doubt the same applies in many other parts of the South. The agronomist at the A. & M. college says that Johnson grass is not to be recommended as a rule as it is generally limited to the more fertile soils and classed as a noxious weed. It will control erosion, he says, but it is adapted to soils which have no particular need of such control. Orchard grass does well in the eastern part of the state and on more fertile soils but does not yield well on thin land. Redtop has given good results in northeastern Oklahoma but is adapted to low, wet, soils. Timothy, tall oat grass, Kentucky bluegrass, meadow fescue, perennial and Italian rye, Dallis grass, and rescue grass are not so valuable where erosion is a serious factor. The native grasses which aid in combatting erosion are often abused by overgrazing. Native grass seed germinates poorly, says the agronomist, and is hard to establish on soil that has been under cultivation.

Bulgarian Agriculture

By Edwin Losey

Ames, Iowa

WITH the strongest Agricultural Party in Europe and with more than 75 per cent of her 5,500,000 people engaged in agriculture, Bulgaria has an agricultural problem that is almost equal to that of the American farmer. The Bulgarian peasant, like the American farmer, is having difficulty in securing a fair profit from the sale of his products. While Bulgaria's export of grain nowhere equals that of the United States, there is the problem of the disposition of a surplus, especially of wheat, yet in many ways the Bulgarian peasant is making greater strides than the American farmer toward relief.

Emerging from the strife and turmoil of the World War the Agricultural Party, according to Matey Alexieff, Bulgarian student at Iowa State College, rapidly assumed the leading political force in the economic development of the state. While not disposing of the king, the party ignored him and proceeded to establish farm relief measures that bid fair to rival any plan adopted for the American farmer.

Agricultural syndicates were established all over the country to handle the peasants' grain. These syndicates correspond to our cooperative systems and carry on their business in practically the same way. The grain is brought into wholesale and storage houses at concentration points and held until the economists who are the leaders in the country consider the export price sufficient to allow a legitimate profit. These syndicates also serve as purchasing agents for the peasants, buying the machinery and materials needed on the farms.

Unlike the American farmers, the peasants are more extreme in their cooperation measures. Since most of the farms are small and the operators live

This typical Bulgarian peasant has paused to rest his oxen.

in villages and operate the land outside, all machinery is more or less common property. No one peasant being able to purchase the needed equipment, the syndicates place enough machines in a village to insure use by everyone. These machines are usually binders and threshing rigs. The threshing rig is used extensively, since wheat is the principal crop. Binders are not numerous, and most of the cutting is done by the old family cradle. The seed is still broadcast. The plowing and tilling are done with oxen or the Bulgarian buffalo and with crude wooden or small modern plows. Also unlike the farmers of America, the peasants rely upon their own families to do the work. Everyone above seven years of age works—men, women, and children. Grandfather, grandmother, and youngest grandson take their place in the fields.

Extension work is still in its infancy in America, and in Bulgaria it could hardly be called that, although it has progressed in greater strides than in America considering the length of time in use. The Agricultural Party greatly increased the establishment of agricultural schools throughout the country and was aided by the government when that body established a Minister of Agriculture.

The Bulgarian schools, like the agricultural schools of America, have their experimental farms and stations, and by bulletins and demonstrations, fairs and exhibitions carry on extensive extension work throughout the rural communities.

The Agricultural Party also took over the banking system that the government had started in the National Agricultural Banks and extended the credit supply to the needy peasants. These banks are located in the principal cities and through the agricultural syndicates finance the peasants in their agricultural operations. It is from these banks that the syndicates secure their money to purchase and place the machinery in the villages.

Like the early development of schools and agricultural colleges and work in America, the Bulgarians have devoted little time or money toward education of their farm women and concentrate upon the agricultural development of the farming communities.

The Value of a Toad

From the Porto Rico Agricultural Experiment Station

Throughout the realm of animal life we live upon each other. One kind keeps another in check by preying upon it. When an animal increases to an extent to hinder the development of another, certain checks operate to curb it and limit its numbers. The greater in size or stronger may attack the lesser or weaker and we call it preying, or it may be the other way around and the weaker attack the stronger living upon it and sometimes carrying a disease to weaken or destroy it.

In keeping down insects that might destroy us or our food crops, we introduce fungus or parasitic diseases or another insect or animal that will devour them outright. If these insects work at night, we should seek those to prey upon them that find their food in the darkness.

(*Turn to page* 53)

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

The problem of fertilizing cotton is of great importance in all of the cotton states, especially those east of the Mississippi river, and this subject is receiving very careful consideration. Circular No. 83 by C. B. Anders, recently published by the Mississippi Experiment Station, takes up some of the most important questions that arise and answers them from results obtained in practical tests conducted by several experiment station workers in the state. The question and answer method of making fertilizer recommendations easily understood is a novel way of putting over this information. Farmers and agricultural workers should be interested in studying this publication.

The Maryland Experiment Station in Bulletin No. 300, by L. B. Broughton, H. L. Marshall, and N. C. Thornton, presents results of a three-year intensive study of potash from Industrial Alcohol (vegetable potash) as compared with the ordinary commercial sources of potash under both greenhouse and field conditions with tomatoes, Irish potatoes, sweet potatoes, tobacco, and wheat. The experiments show the vegetable potash to be superior for all of these crops, except wheat where little or no increase in yield or quality was recorded. Vegetable potash contains approximately 35 per cent of water soluble potash, 40 per cent of which is in the form of sulphate, 40 per cent in the form of muriate, and from 10 to 20 per cent in the form of carbonate. The alkaline reaction of this material frequently results in the reversion of the phosphoric acid in a fertilizer mixture. Experiments show that the best results are obtained when the alkaline content of the fertilizer mixture is kept low. To accomplish this, it is necessary to secure from ½ to ¾ of the potash from muriate, the remainder from vegetable potash. One important observation in this study is that the use of tankage for supplying about 1/3 of the required ammonia apparently overcomes the tendency of the vegetable potash to cause phosphoric acid reversion.

"Fertilizer Experiments with Cotton," Agr. Exp. Sta., Auburn, Ala., Bul. 228, Feb. 1929, J. T. Williamson.

"Fertilizer Experiments with Truck Crops in Southern Illinois," Agr. Exp. Sta., Urbana, Ill., Bul. 319, Feb., 1929, J. W. Lloyd.

"Analyses of Commercial Fertilizers and Ground Bone; Analyses of Agricultural Lime, 1928," Agr. Exp. Sta., New Brunswick, N. J., Bul. 481, Dec., 1928, Chas. S. Cathcart.

"Fertilizer Registrations for 1929," Agr. Exp. Sta., New Brunswick, N. J., Bul. 482, Jan., 1929, Chas. S. Cathcart.

Soils

In Circular No. 342 of the Illinois Experiment Station, the authors, L. H. Smith and F. C. Bauer discuss in a most interesting manner "Caring for the Fertility of Illinois Soils." The Illinois system of soil fertility, according to the authors, involves provision for a permanent as well as a profitable agriculture. This calls for a program of soil management which recognizes the necessity of maintaining good physical condition, favorable biological activity, suitable soil reaction, and an adequate supply of available plant food ele-

ments throughout the growing season. It emphasizes particularly the law of the minimum, that is, that no benefit can result from the application of a given plant food element unless the need for that element is a limiting factor in plant growth.

Realizing that few reliable data are at hand upon which to base recommendations for the use of fertilizer, the Experiment Station is making an effort to procure more information. Experiments during the past year have been considerably expanded so that they include not only work on most of the old established soil fields, but are supplemented by a series of cooperative experiments with farmers. Of particular interest is the appeal to farmers to determine their individual fertilizer needs by actual trial.

"Soil Reaction and Liming as Factors in Tobacco Production in Connecticut," Agr. Exp. Sta., New Haven, Conn., Bul. 306, Apr., 1929, M. F. Morgan, P. J. Anderson, and Henry Dorsey.

"Crop Yields from Illinois Soil Experiment Fields in 1928, Agr. Exp. Sta., Urbana, Ill., Bul. 327, May, 1929, F. C. Bauer.

"Soil Survey Bishop Area, California," U. S. D. A., Washington, D. C., No. 3, Series 1924, E. B. Watson and R. Earl Storie.

"Soil Survey the Hollister Area, California," U. S. D. A., Washington, No. 20, Series 1923, Stanley W. Cosby and E. B. Watson.

"Soil Survey of Minidoka Area, Idaho," U. S. D. A., Washington, D. C., F. O. Youngs, Mark Baldwin, A. J. Kern, and G. R. McDole.

"Soil Survey of Lawrence County, Indiana," U. S. D. A., Washington, D. C., W. E. Tharp, T. M. Bushnell, J. E. Adams, A. T. Wiancko, and S. D. Conner.

"Soil Survey of Monroe County, Indiana," U. S. D. A., Washington, D. C., T. M. Bushnell, Earl D. Fowler, A. T. Wiancko, and S. D. Connor.

"Soil Survey of Iowa Harrison County," Agr. Exp. Sta., Ames, Iowa, Soil Survey Report No. 55, W. H. Stevenson, P. E. Brown, T. H. Benton, L. W. Forman, and H. R. Meldrum.

"Soil Survey of Iowa Plymouth County," Agr. Exp. Sta., Ames, Iowa, Soil Survey Report No. 54. W. H. Stevenson, P. E. Brown, D. S. Gray, L. W. Forman, and H. R. Meldrum.

"Soil Survey Worcester County, Maryland," U. S. D. A., Washington, D. C., No. 11, Series 1924, S. O. Perkins and S. R. Bacon.

"Soil Survey Hillsdale County, Michigan," U. S. D. A., Washington, D. C., No. 10, Series 1924, J. O. Veatch, James Tyson, P. R. Biebesheimer, and J. W. Moon.

"Soil Survey of Macomb County, Michigan," U. S. D. A., Washington, D. C., Robert Wildermuth, J. W. Stack, and J. O. Veatch.

"Soil Survey of Ogemaw County, Michigan," U. S. D. A., Washington, D. C., J. O. Veatch, L. R. Schoenmann, G. L. Fuller.

"Soil Survey of Jackson County, Minnesota," U. S. D. A., Washington, D. C., M. W. Beck, J. Ambrose Elwell, J. S. Hall, and G. B. Bodman.

"Soil Survey Harrison County, Mississippi," U. S. D. A., Washington, D. C., No. 7, Series 1924, Robt. Wildermuth, J. Ambrose Elwell, B. H. Williams, A. L. Gray, J. A. Kerr, M. J. Edwards.

"Soil Survey of Perry County, Mississippi," U. S. D. A., Washington, D. C., E. Malcolm Jones, J. A. Kerr, S. B. Cole, and E. P. Lowe.

"Soil Survey Lawrence County, Mississippi," U. S. D. A., Washington, D. C., No. 34, Series 1923, A. T. Sweet, Howard V. Jordan.

"Soil Survey Buffalo County, Nebraska," U. S. D. A., Washington, D. C., No. 12, Series 1924, F. A. Hayes, A. N. Huddleston, M. H. Layton.

"Soil Survey of the Moapa Valley Area, Nevada," U. S. D. A., Washington, D. C., F. O. Youngs and E. J. Carpenter.

"Soil Survey of Green County, North Carolina," U. S. D. A., Washington, D. S., S. O. Perkins and H. G. Lewis.

"Soil Survey of Clermont County, Ohio," U. S. D. A., Washington, D. C., Arthur E. Taylor, Ivan Hodson, G. W. Conrey, William Craig, B. D. Morgan.

"Soil Survey of Fulton County, Ohio," U. S. D. A., Washington, D. C., Arthur T. Taylor, R. A. Winston, G. L. Fuller, and G. W. Conrey.

"Soil Survey of Polk County, Oregon," U. S. D. A., Washington, D. C., E. F. Torgerson, Chas. Hartmann, Jr., E. J. Carpenter, and W. G. Harper.

"Soil Survey Walworth County, South Dakota," U. S. D. A., Washington, D. C., No. 33, Series 1923, J. A. Machlis and G. A. Larson.

"Soil Survey of Harris County, Texas," U. S. D. A., Washington, D. C., H. V. Geib, T. M. Bushnell, and A. H. Bauer.

"Soil Survey (Reconnaissance) of West-Central Texas," U. S. D. A., Washington, D. C., W. T. Carter, M. W. Beck, W. W. Strike, B. H. Hendrickson, R. E. Devereux, H. W. Hawker, and H. V. Geib.

"Soil Survey of Green Lake County, Wisconsin," U. S. D. A., Washington, D. C., W. J. Geib, A. C. Anderson, E. H. Bailey, M. J. Edwards, Homer Chapman, Oscar Magistad, F. J. O'Connell, T. J. Dunnewald, and Kenneth Whitson.

"Soil Survey of Green County, Wisconsin," U. S. D. A., Washington, D. C., W. J. Geib, A. C. Anderson, F. J. O'Connell, T. J. Dunnewald, M. J. Edwards, Walter Vosquil, and Kenneth Whitson.

Crops

The June issue of the Journal of the American Society of Agronomy is devoted entirely to the subject of pasture management research. Farm management specialists, economists, animal nutrition specialists, agronomists, and others interested in the big problem of pasture research met December 28, 1928, at Columbia University to discuss this important problem. The papers presented at that time resulted in bringing together in most interesting form a vast amount of data which should prove most helpful to students and investigators interested in better utilization of our pasture lands.

Also among the new publications to be listed under this section will be found several reports of experiment stations which give concise summaries of the important work. It is well worth the time of agricultural scientists to carefully look over these reports.

"Monthly Bulletin of the Department of Agriculture," Sacramento, Cal., Vol. XVIII, No. 5, May, 1929.

"Report of the Director for the Year Ending October 31, 1928," Agr. Exp. Sta., New Haven, Conn., Bul., 298, Dec., 1928, Wm. L. Slate.

"Cotton Variety Test, 1928," Agr. Exp. Sta., Experiment, Ga., Cir. 83, Jan., 1929, H. P. Stuckey.

"Strawberry Club Manual," Agr. Exp. Sta. Urbana, Ill., Cir. 339, May, 1929, A. S. Colby.

"The Forty-first Annual Report of the University of Maryland," Agr. Exp. Sta., College Park, Md., H. J. Patterson.

"Physiological Shrinkage of Potatoes in Storage," Agr. Exp. Sta., College Park, Md., Bul. 308, Dec., 1928, C. O. Appleman, W. D. Kimbrough, and C. L. Smith.

"Artificial Ripening of Fruits and Vegetables," Agr. Exp. Sta., University Farm, St. Paul, Minn., Bul. 247, Oct., 1928, R. B. Harvey.

"Reed Canary Grass," Agr. Exp. Sta., University Farm, St. Paul, Minn., Minn. Bul. 252, March, 1929, A. C. Arny, M. C. Hansen, R. E. Hodgson, and G. H. Nesom.

"Regional and Seasonal Distribution of Moisture, Carbohydrates, Nitrogen, and Ash in 2-3 Year Portions of Apple Twigs," Agr. Exp. Sta., University Farm, St. Paul, Minn., Hamilton Paul Traub.

"Corn Seed Treatment Experiments," Agr. Exp. Sta., A. & M. College, Miss., Cir. 81, Dec., 1928, H. H. Wedgworth, E. B. Ferris, H. F. Wallace, and H. A. York.

"Cotton Varieties," Agr. Exp. Sta., A. & M. College, Miss., Cir. 82, Dec., 1928, J. F. O'Kelly and W. W. Hull.

"Report of Raymond Branch Experiment Station, 1928," Agr. Exp. Sta., A. & M. College, Miss., Bul. 262, Dec., 1928, H. F. Wallace and J. L. Cooley, Jr.

"Report of Holly Springs Branch Experiment Station, 1928," Agr. Exp. Sta., A. & M. College, Miss., Bul. 264, Dec., 1928, C. T. Ames and Otis B. Casanova.

"Growing Satsuma Oranges in South Mississippi," Agr. Exp. Sta., A. & M. College, Miss., Bul. 265, Dec., 1928, W. S. Anderson.

"Report of the South Mississippi Branch Experiment Station for 1928," Agr. Exp. Sta., A. & M. College, Miss., Bul. 266, Dec., 1928, W. R. Perkins, W. S. Anderson, and W. W. Welborne.

"Spring Grains in New Jersey," Agr. Exp. Sta., New Brunswick, N. J., Bul. 473, Oct., 1928, H. B. Sprague and E. E. Evaul.

"A Device for Determining the Texture of Peach Fruits for Shipping and Marketing," Agr. Exp. Sta., New Brunswick, N. J., Cir. 212, Feb. 1929, M. A. Blake.

"A Standard for Estimating the Twig Growth of One-Year-Old Peach Trees," Agr. Exp. Sta., New Brunswick, N. J., Bul. 475, Dec., 1928, M. A. Blake and G. W. Hervey.

"Nitrate Assimilation by Asparagus in the Absence of Light," Agr. Exp. Sta., New Brunswick, N. J., Bul. 476, Dec., 1928, G. T. Nightingale and L. G. Schermerhorn.

"Seedling Fruit Stocks," Agr. Exp. Sta., Geneva, N. Y., Bul. 569, Apr., 1929, H. B. Tukey.

"Fifty-first Annual Report of the North Carolina Agricultural Experiment Station," State College Station, Raleigh, N. C., R. Y. Winters.

"Williston Substation Report," Agr. Exp. Sta., Fargo, No. Dak., Bul. 227, May, 1929, E. G. Schollander.

"Wheat Growing in Ohio," Agr. Col. Ext. Serv., Columbus, Ohio, Bul. 81, 1928-29, Earl Jones.

"Fruit Varieties in Ohio, IV—Crab Apples," Agr. Exp. Sta., Wooster, Ohio, Bul. 434, Apr., 1929, C. W. Ellenwood.

"Investigations Relating to the Handling of Sweet Cherries," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 247, May, 1929, Henry Hartman and D. E. Bullis.

"Tests of Small Spring Grains," Agr. Exp. Sta., State College, Pa., Bul. 234, Nov., 1928, Chas. F. Noll and C. J. Irvin.

"Sudan Grass for Hay, Seed, and Pasture," Agr. Exp. Sta., College Station, Tex., Bul. 396, Apr., 1929, R. E. Karper, J. R. Quinby, and D. L. Jones.

"Annual Report of the Virginia Polytechnic

Institute," Agr. Exp. Sta., Blacksburg, Va., A. W. Drinkard, Jr.

Economics

With the increased commercialization and specialization of agriculture, credit has become of greater importance in farming operations. Technical Bulletin 55, "The Agricultural Situation in Minnesota," by B. M. Gile and J. D. Black, of the Minnesota Agricultural Experiment Station, is a study of the credit situation in this state. The recent failures in banks in rural areas emphasize the importance of special studies of rural credit.

"An Economic Study of 93 Apple Farms in Oxford County, Maine, 1924-27," is the title of a new bulletin No. 347, by the Maine Experiment Station. Charles H. Merchant, the author, among other things in his study, shows that for the three years the average inome was $553. When interest on the average investment of $7,592 at 5 per cent ($380) was deducted, the average labor income was about $173. The apple receipts per farm averaged $725 or 27 per cent of the total receipts.

"Facts and Problems of Farm Credit in Craighead County, Arkansas," Agr. Exp. Sta., Fayetteville, Ark., Bul. 233, June, 1929, Arthur N. Moore and C. O. Brannen.

"The Watermelon Industry of Georgia," Ext. Div., Col. of Agr., Athens, Ga., Bul. 369, J. William Firor.

"The Taxation System of Kansas," Agr. Exp. Sta., Manhattan, Kans., Cir. 144, Mch., 1929, Harold Howe.

"The Manufacture and Distribution of Tomatoes, Sweet Corn, and Peas in Maryland," Agr. Exp. Sta., College Park, Md., Bul. 301, W. J. Hart.

"An Economic Study of the Production of Tomatoes in Maryland," Agr. Exp. Sta., College Park, Md., Bul. 304, Mch., 1929, Wm. Paul Walker.

"What Does it Cost to Grow a Bushel of Apples?" Agr. Exp. Sta., Wooster, Ohio, Bul. 435, May, 1929, F. H. Ballou.

"Cost and Efficiency in Producing Alfalfa Hay in Oregon," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 241, Dec., 1928, H. E. Selby.

"Profitable Farming Systems on Dark Tobacco Farms," Va. A. & M. College, Blacksburg, Va., Bul. 112, Mch., 1929, A. P. Brodell, C. C. Taylor, and H. E. McSwain.

Insects

"The Relation of Woolly Apple Aphis to Perrenial Canker Infection with Other Notes on the Diseases," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 243, May, 1929, Leroy Childs.

"Spraying Experiments for Codling Moth Control," Agr. Exp. Sta., Pullman, Wash., Bul. 232, Mch., 1929, Anthony Spuler.

Diseases

Testifying to the importance which mosaic is assuming as a major crop disease, we find it discussed in five of the bulletins on diseases which have come to hand this month. Agricultural workers and growers who are interested in learning more about mosaic will find these bulletins of value.

"Cotton Wilt Studies — II. Preliminary Studies on Wilt Resistance and on the Effect of Certain Soil Factors on the Development of Cotton Wilt," Agr. Exp. Sta., Fayetteville, Ark., Bul. 234, May, 1929, V. H. Young, J. O. Ware, and George Janssen.

"Effect of the Mosaic Disease on Yield and Quality of Tobacco, With Suggestions for Control," Agr. Exp. Sta., College Park, Md., Bul. 302, Dec., 1928, J. E. McMurtrey, Jr.

"Degeneration Diseases of the Irish Potato in Mississippi," Agr. Exp. Sta., A. & M. College, Miss., Bul. 258, Sept., 1928, H. H. Wedgworth.

"Investigations on Diseases of Vegetable and Ornamental Plants," Agr. Exp. Sta., A. & M., College, Miss., Bul. 261, Nov., 1928, H. H. Wedgworth.

"The Occurrence and Prevention of Calyx Injury to Apples from the Hood River Valley," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 242, May, 1929, Henry Hartman, Leroy Childs, and R. H. Robinson.

.."Four Major Tobacco Diseases in Virginia and Their Control," Va. A. & M. College, Blacksburg, Va., Ext. Bul. 110, Dec., 1928, James Godkin.

"Calcium Sulphide for the Control of Apple and Peach Diseases," Agr. Exp. Sta., Blacksburg, Va., Tech. Bul. 36, Feb., 1929, R. H. Hurt and F. J. Schneiderhan.

"The Classification of Certain Virus Diseases of the Potato," Agr. Exp. Sta., Madison, Wis., Research Bul. 87, Jan., 1929, James Johnson.

Father—"I never kissed a girl until I married your mother. Will you be able to say the same to your son when you become a married man?"

Son—"Not with such a straight face as you can, father."

Pages From A Field Note Book

Orchard Cover Crops

By Wm. L. Teutsch

Assistant County Agent Leader, Oregon Agricultural College

ORCHARD cover crop demonstration tests conducted by county agents in four western Oregon fruit growing counties this year point the way to rebuilding fertility of old orchard soils. In each instance vetch and oats were used as the cover crop, and applications of superphosphate, ammonium sulphate, ammonium sulphate and superphosphate in combination, nitrate of soda, ground limestone, and a complete 5-7-8 were made. Each of these fertilizers was applied at the same dollar's worth per acre, the applications ranging from 150 pounds per acre of the ammonium sulphate to 300 pounds per acre of superphosphate.

In April just before the cover crops were plowed down, the cover crop growth on the various plots was carefully measured. Results were fairly uniform. In three of the four counties sulphate of ammonia gave the largest increase ranging from 235 per cent to 375 per cent over the check which received no treatment. In one county superphosphate and sulphate of ammonia in combination gave the best results with an increase of 335 per cent over the check as compared with sulphate of ammonia alone with a 255 per cent increase. In all demonstrations, however, these two applications gave the best increases.

In many old orchards due to the lack of fertility and low organic matter content it is impossible to grow a cover crop of sufficient size by the time it should be plowed down in the spring to conserve moisture to make it profitable. The use of commercial fertilizer stimulates the growth and after a few years of continued application the fertility is built up to a point where satisfactory cover crops can be grown without the use of the fertilizer.

Top-dressing Cotton

By Charles Kilpatrick

Fort Smith, Arkansas

DECLINING yield in all major farm crops is the one big problem confronting the Oklahoma farmer today. The landowners are becoming vitally interested because farms no longer pay interest and taxes. The tenant is concerned, because it is becoming difficult for him to provide

a decent living for his family, educate his children, and lay by a sufficient amount for old age.

The decrease in the productivity of the farms is not because the farmers of today are not as well skilled in farming as they were a few years ago, but in many cases low yields have been due to soil erosion and loss of fertility. The soil has been allowed to wash away, carrying with it organic matter and available plant food. The one-crop system has also played its part.

Jim Littlefield, Braden, Oklahoma, who is president of the Le Flore County Agricultural Advisory Committee, while discussing the problem with Carl West, county agent, last summer, was asked to conduct a demonstration with top-dressing cotton with muriate of potash. Little is known about fertilizers in Oklahoma, but the farmers do know that cotton rust cuts their yield materially. Mr. Littlefield had never used commercial fertilizer, but he agreed to conduct the demonstration.

Mr. West measured off two equal size plots on very uniform land, and to one plot 100 pounds of muriate of potash were applied as a top-dresser at chopping time. On the other plot nothing was applied. Both plots were picked three times, and it was found that the potash increased the yield from 1,164 pounds seed cotton where no fertilizer was applied to 1,372 pounds seed cotton on the fertilized plot, giving him an increase of 208 pounds per acre. Figuring seed cotton at seven cents per pound and the cost of the potash at $2.50 per hundred this gave Mr. Littlefield an increase of $12.06 per acre.

In reporting his observations to Mr. West, Mr. Littlefield said, "Carl I have decided that a farmer must feed his soil before it will feed him." Mr. Littlefield also noticed that the cotton where the potash was applied was healthier, had larger bolls, and was much easier to pick.

The demonstration told the story, yet Mr. Littlefield had supposed that because he had rich bottom land, he did not need to apply any fertilizer.

Better Fibre Flax

By F. L. Ballard

County Agent Leader, Oregon Agricultural College

THERE is an increasing acreage of fibre flax being grown in Oregon. The State Penitentiary has been handling flax for some years, and within the past five years two manufacturing companies have turned to linen production. Farmers in the Willamette Valley are finding fibre flax a fairly satisfactory crop.

Like all other crops newly introduced, it has been somewhat overboomed by promoters with the result that unsuitable lands have been planted and the proper cultural methods have been slighted. When properly grown the crop makes a return somewhat greater than from spring grains which are extensively grown in the Valley.

The secret underlying profits is, of course, length of fibre, and to grow the tallest flax possible is the aim of every well-informed farmer who raises this crop.

Experiments throughout the Willamette Valley bring out clearly that the use of potash increases the length, strengthens the fibre and, therefore, the value of the flax. Even where long fibre is produced naturally as on

the muck and peat soils, the quality and fibre content are low unless potash is applied. Compared with unfertilized flax more than three times as much fibre has been produced by plants grown on these muck soils where potash was used.

Flax responds to long periods of daylight and good supplemental irrigation. Early spring planting will usually bring the period of greatest growth within the longest days of the season.

Clover-sod land, free from weeds, or a good loam soil well supplied with organic matter are most desirable for flax. Full returns from potash fertilizers are realized only when a fair amount of nitrate is present or is artifically supplied. Clover sod most satisfactorily supplies this condition.

For two seasons irrigation was found to increase the length of fibre flax, making the yield 50 per cent greater than on unirrigated plots.

Potash-fed Dahlias

By J. M. Graham

Mt. Holly, New Jersey

WARREN W. MAYTROTT, owner and manager of Dahliadel Nurseries at Vineland, N. J., says that "potash-fed dahlias" is not a secret or just a trade name, but a modern method of growing dahlias, so that they are literally alive with energy, making failure well-nigh impossible. In fact, Mr. Maytrott believes potash so necessary to successful dahlia growing that he uses the words "Grow Potash-fed Dahlias" in his trade mark.

He attributes to nitrogen sturdy growth above the ground, the production of large bushes and flowers, but states that if nitrogen is used to excess, the vitality of the tubers is lowered and the flowers will be soft, wilting easily.

Phosphorus increases root development and aids in strengthening plant and tuber growth.

Potash balances the other two, gives color to the flower and foliage, and vigor and tone to the plant in general. It aids in the development and maturing of well-nourished tubers.

Hungry Cotton

(*From page* 19)

seed cotton, or an increase of 416 pounds of seed cotton per acre.

Figuring seed cotton at seven cents per pound and the retail price of potash at $2.50 per hundred gave Mr. McNutt an increase of $24.12 per acre.

Mr. McNutt, in submitting this report summed up his demonstration as follows: Cothern, that potash paid better than $5.00 for $1. The bolls were larger and the cotton did not shed so bad. The cotton where I put the potash grew faster and headed the boll-weevils off, and it was easier to pick, too."

Keeping-up With Facts

(*From page* 29)

Lacy has answered this query by providing a monthly mimeographed publication called Agricultural Economics Literature which reviews all important new books on any phase of agricultural economics, gives descriptive notes of all other new books on the subject, mentions all new bibliographies made available by the library, mentions all important articles on agricultural economics chosen critically from 103 domestic and 147 foreign periodicals, and lists the new economic publications issued by any State agricultural institution or the United States Department of Agriculture. She believes in making facts a vital part in the thinking of rural leaders and in the action of working farmers.

Smut-free Areas

(*From page* 24)

produced about 8,000 bushels of wheat that had less than one per cent of smut. This seed will not be badly smutted because there were no sources of infection. This statement is not based on theory but on actual demonstrations of the use of such wheat in this area. The success of a smut-free area depends on the hearty cooperation of all farmers within it. A single smutted field may ruin the entire project.

In barley smuts, hot water treatment is highly successful. It is possible in this case to eradicate the smut in large areas in two years. By community seed treating in Harrison county, we eradicated practically all smut from barley in the entire county in two years. The loose smut of barley does not spread as easily as does the loose smut of wheat. Our experiences in Indiana show that in closely adjacent fields the smut will not spread perceptibly.

A question that is often asked is if there is danger of causing smut by spreading infested straw on the field, meaning, of course, straw that is covered with smut spores. There is no danger in either wheat or barley from this procedure, because the smut spores cannot effectually infect the plants after they emerge from the ground. After the seedling attains a length of about two inches it is immune from the attack of smut.

Agriculture Today

(*From page* 22)

schedule and for a considerable period of time. The Weather Bureau furnishes the necessary recording instruments with forms upon which to enter the data, and agrees to summarize the daily information into convenient form for conversion into monthly and yearly values, and then into other forms to show the normal characteristics of the weather for the particular point of observation.

This force of cooperative and other observers numbers more than 5,000 persons, the summarized observations

These horses and mules took refuge on this mound at Arcola, Mississippi, from the Mississippi flood.

being distributed for the immediate use of persons interested in the relation of agricultural production to current weather conditions, and later incorporated into climatic tables for study of the possibilities of successful agricultural operations in any part of the country.

"These data," Dr. Marvin says, "can be used successfully by farmers in many ways. They are valuable in studying the adaptability of localities to the production of new crops that the experience of other farmers has shown may be grown successfully under certain known weather conditions. With knowledge of the average conditions of a locality, farmers may vary the time of planting to adjust the period of important crop development to the average period in which the weather elements prove most favorable.

"If it is found after a long series of observations that a certain locality shows prevailing early frosts in autumn, farmers may develop quick maturing crops to overcome this condition; on the other hand, should a section show frequent recurring droughts at certain periods of the growing season, farmers may resort to earlier planting dates, or by later planting secure a more favorable period for the important or critical development stages. Similar data for other localities are valuable to farmers who may desire to transfer their operations to other sections of the country by providing the climatic factors necessary to meet the requirements of the crops to be cultivated, or by indicating the possibilities of taking up new lines of farming."

The Value of a Toad

(*From page* 44)

There are four night-feeding insects that are especially destructive in Porto Rico: the May bettle (Lachnosterna) and its white grub, the slug or snail, the changa or mole cricket, and the cockroach. These are not so destructive in some other tropical lands as here. The May beetle and the changa are not considered pests in Cuba as we find them to be with us. There is some enemy that keeps them in check. I believe it is the toad or frog.

In 1920 we introduced from Barbados the Surinam toad (*Bufo agua*), releasing them at this station. They have increased and spread rapidly so that the western end of the island is well populated with them. They are now being shipped out to other sec-

tions of the island. Just how far they have extended naturally it is impossible to say. Planters report greatly decreased depredations of the changa and white grub in this section.

Toads are nocturnal in their habits and burrow in the ground during the day. They are more frequently seen on the roads at night as shown by the lights of passing automobiles and are crushed by the passing cars.

The *Bufo agua* is the largest of the toads and is good for food. It is sometimes called mountain chicken in the Leeward Islands. While promising to be of great benefit to us in keeping in check some of the most destructive insects known in our agriculture, it will also add to our food supply.

In some countries toads are sold to gardeners and greenhouse owners for keeping injurious insects in check. They are long-lived creatures. There is record of one living to the age of 36 years. It has been estimated (Nature Library: Frogs—page 84) from the examination of the stomach contents that 88 per cent of its food is insect pests; that in three months a single toad will eat 9,936 injurious insects. Counting the injury to plants prevented by the destruction of this number of insects, the value of a toad is placed at $19.88 per year.

Tobacco

(*From page* 27)

in its production.

Tobacco is cultivated on a wide range of soils, but soil types have an important bearing upon the quality of the tobacco leaf and determine to a large extent its value and use in commerce. While it can be grown almost anywhere in the temperate zones, it tends to be largely localized and it is usually an important cash crop in the areas where it is produced. It prefers a soil of fairly high fertility, and for that reason it is an important consumer of commercial fertilizers which more and more are being employed in its culture.

There are many types of tobacco with varying qualities, but those grown in the United States can be classified under three main heads, the cigar type, manufacturing types, and export types. The cigar type of leaf tobacco is quite largely grown in the northern states, particularly the Connecticut valley, Pennsylvania, Ohio, and Wisconsin. A less extensive production of cigar leaf tobacco also is found in Florida. There are three main types of cigar leaf tobacco, the wrapper type which is grown mostly in the Connecticut valley and in Florida, the binder type which is grown largely in Wisconsin and New York, and the filler type which is grown most extensively in Pennsylvania, Ohio, Indiana, and Wisconsin.

The manufacturing types vary considerably, among the best known being the Burley which centers in the Bluegrass region of Kentucky and is grown to some extent also in surrounding territory. Burley is used largely for the manufacture of smoking and chewing tobacco. The Flue-cured type is grown quite extensively in the old seaboard tobacco states of Virginia and the Carolinas. The Flue-cured type is used very largely for cigarette manufacturing. The Export or Fire-cured type of tobacco is grown largely in Tennessee, Kentucky, Maryland, and adjoining states. This tobacco is very dark in color and for the most part is exported.

As a cash crop, tobacco is of considerable importance, especially in the

eastern states. In 1928 it is estimated that 1,912,000 acres were grown in the United States with an average yield of 964 pounds per acre and a total production of slightly over 1,373,000,000 pounds. The value of the crop last year was estimated at about $254,000,000,000. Normally between 35 and 40 per cent of the tobacco grown in the United States is exported, a very large part of it going to the United Kingdom, Northern Europe, and the Orient, particularly China. North Carolina leads in acreage with 650,000 acres for last year, followed by Kentucky, Virginia, and South Carolina.

Outside of the United States there are a number of tobacco centers, but from the standpoint of total production these are much less important. The leading foreign areas are the East Indies which produce about 11 per cent of the world's total, Russia, Greece, and the Philippine Islands. The total production of these countries and the United States usually aggregates about three-fourths of the world's output, the remainder being scattered widely. Special types of tobacco are produced in a number of minor areas throughout the world and some of these are imported for American manufacture. Probably the best known of these import types are the Cuban leaf tobacco and the Turkish cigarette types.

The Loan Value of Farm Property

(*From page* 10)

lend only 20 per cent on the valuation that you are talking about!"

"But when you stop to consider that in some parts of the country you can find farms with buildings costing from $20,000 to $30,000 to reproduce, and yet which can't be sold—land and buildings—for more than $5,000 to $10,000, you can easily see why we can't lend money on those buildings on the basis of their replacement value," continued Mr. Jones. "Farmers seem to have been caught between a depression in the selling price of the land and an increase in the cost of reproduction of the buildings. And that brings up a point which ought to be considered more carefully nowadays.

"You know we find a lot of farmers who don't think any too much about insurance. Suppose their barns or their houses were to be destroyed by fire and they had no insurance. I can tell you what would happen. The buildings would not be rebuilt, the farms would stand idle or some of the land would be rented out on shares to the neighbors, and the family, if it had escaped an awful death by fire, moved to town.

"Every farmer who borrows money on a mortgage, of course, has to take out some insurance. And it is a mighty good thing they do, for I don't figure that they can afford to carry their own fire hazard. The Federal Land Banks are the greatest repositories of farm insurance policies, along with the mortgages on farms upon which they loan, of any institutions in the world.

"If the farmers only realized that a farm family of 10 persons is burned to death each day of the year and that the total amount of farm fire losses is approximately $150,000,000 each year, they would take all reasonable precaution to prevent fires and think twice before they failed to carry adequate coverage or let their policies lapse through carelessness.

"You know, the Federal Land Banks require that the buildings be covered with insurance to the extent of at least 60 per cent of their appraised value.

"But I'm wandering away from

your original question, or possibly I have answered you by this time," continued the Secretary. "Your land is good enough so that I should think we can lend 50 per cent of its value from an agricultural production standpoint. That would give enough to take up that three-year mortgage of yours that's coming due, and once you have that accomplished you don't need to worry your brain about whether the Department of Agriculture's scientists or statisticians give farmers credit for their food, fuel, and shelter in terms of a monetary return or whether they just grant them, so to speak, a good living in addition to their cash returns."

Making Mucks Pay

(*From page* 8)

half as much fertilizer can be applied safely in the row as can be applied broadcast.

Adding Potash

The distribution of muck land in the north central states is such that many fields of clay loam or sandy loam contain a few acres of muck soil. In the fertilization of the field for cropping, the farmer often finds it convenient to use the same mixture on both the ordinary (mineral) and muck soil, with the result that the crop on the muck soil is generally a failure. The crop on this portion of the field can be greatly improved by the addition of some potash to make the fertilizer a balanced one for muck soil.

The Ten Commandments for Muck

1. Select a type of muck which is adapted to the crop that you wish to grow.

Yields Per Acre
8,232.2 lbs. 4,545.5 lbs. 10,247.0 lbs.

2. Drain the muck so that the water level during the summer will remain uniformly at a depth best suited to your crop.
3. Keep the soil compact in order to minimize danger from drought and frost.
4. Control the weeds by shallow cultivation while the weeds are small.
5. Protect your crop from possible destruction from windstorms by the planting of windbreaks and strips of grain and by the construction of barriers to break the force of the wind.
6. Do not apply lime in any form unless the muck is low in lime content, as indicated by its very strongly acid reaction.
7. Control disease and insect pests which may otherwise injure and destroy your crops.
8. For good yields and high-quality crops, use a fertilizer high in potash content.
9. To produce a good yield, make an application each year of sufficient fertilizer for the crop to be grown, working the fertilizer into the soil with disc or spring tooth harrow, or placing part of it in the row at least two inches away from the seed.
10. Consult your Agricultural College for the best methods of muck land management for your muck and your crop.

EFFECT OF APPLICATION OF POTASH ON YIELD OF CROPS AS DETERMINED BY THE MICHIGAN STATE EXPERIMENT STATION

Year of test	Location and soil	Crop	Fertilizer formula and pounds per acre	Yield per acre	Increase due to potash	Cost of producing each unit of increased yield*
4-year average 1922-1925	Eaton Co., Michigan Deep muck	Potatoes	0-0-25 @ 600 No fertilizer 0-8-25 @ 600 0-8-0 @ 600	232 bu. 95 bu. 342 bu. 82 bu.	137 bu. 260 bu. 	10.9 cents per bu. 5.8 cents per bu.
3-year average 1925-1927	Ingham Co., Michigan Deep muck	Onions	0-0-25 @ 1,000 No fertilizer 0-12-25 @ 1,000 0-12-0 @ 1,000	131 bu. 53 bu. 482 bu. 103 bu.	78 bu. 379 bu. 	16.0 cents per bu. 3.3 cents per bu.
1921	Berrien Co., Michigan Deep muck	Stock carrots	0-0-50 @ 200 No fertilizer	22.5 tons 6.1 tons	16.4 tons	30.5 cents per ton
1924	Ingham Co., Michigan Deep muck	Sugar beets	0-0-50 @ 300 No fertilizer	10.0 tons 3.6 tons	6.4 tons	$1.17 per ton
2-year average 1923-1924	Ingham Co., Michigan Deep muck	Timothy and alsike clover	0-0-50 @ 300 No fertilizer	2.3 tons 1.0 tons	1.3 tons	$5.77 per ton
1921	Lapeer Co., Michigan Deep muck	Corn	0-0-50 @ 200 No fertilizer	77.0 bu. 9.7 bu.	67.3 bu.	7.4 cents per bu.

* Calculated on basis of $50.00 per ton for muriate of potash.

Ohio

(*From page* 16)

seed, in addition to the usual broadcast application of manure or fertilizer, is proving highly profitable in hastening maturity and increasing yields. Fertilizer drilled separately in advance of the wheat has not given as large yields as the same amount drilled in with the seed in the ordinary way.

The order of the crops in rotation has affected the crop yields as shown by the 13-year average of 40 different rotations. Wheat, for instance, has invariably given the largest yields after potatoes, followed in order by wheat after red clover, oats, corn, and soybeans.

The Station maintains an experimental herd of about 90 purebred Holsteins and Jerseys, a herd of 70 Aberdeen Angus, and feeds 100 or more western range calves each year. Fifty

to sixty Duroc-Jersey brood cows at the Station, and as many more on the county experiment farms, with their annual and semi-annual litters are used in the experiments in pork production. About 1,500 sheep, mostly purebred Merinos, are kept for breeding, feeding, wool-production, and parasite experiments.

Experimental lots of White Leghorns are maintained on several of the farms to supplement extensive work at the Station poultry plant. The interest in the Station work is shown by the fact that the poultry division alone answered more than 6,000 inquiries in 1928.

From the beginning, work in disease and insect control has kept pace with other activities of the Station. In 1889 the Agricultural Scientist stated that the idea of combining insecticides and fungicides probably originated with the entomologists and Botanists of the Ohio Station. Be that as it may, they have had some share in the control of Hessian fly, San Jose scale, smuts of wheat and oats, apple scab, and many other enemies.

The Station has always been quick to meet new enemies in the field. The European corn borer, for instance, had no sooner entered the State than the best available trained specialists were sent into the infested areas with well-equipped laboratories and ample means to study the pest and investigate possible methods of control. A farm near Toledo, in what has since become the most heavily infested area of the State, was leased for experimental purposes. In February, 1929, the Station published a monograph bulletin of 196 pages on the "European Corn Borer and Its Environment," embodying the results of the work of 16 entomologists, agronomists, botanists, soil specialists, and agricultural engineers who are cooperating in the investigations.

The Horticultural and Forestry departments have done work as creditable and important as any mentioned. Three new departments—Rural Economics, Home Economics, and Agricultural Engineering—were organized as a result of the Purnell Act. By arrangement with the State University, the heads of these departments in the University became chiefs of the Experiment Station departments and give part time to directing the research and experimental work. In all, the 10 departments maintain a scientific staff of 125 members.

The Last Battle

(*From page* 18)

The possibility of using all corn stalks for making wall board may be further developed and thus give to the man the advantage in the fight by completely removing from all fields the last possible refuge of the borer.

The potato crop furnishes a large supply of human food. There are at least 16 different groups of insects that compete with man for this article of food. These combined enemies of man take an enormous toll from the potato crop valued at many millions of dollars annually. Much of the toll also is taken by insects which are difficult or impossible to control, such as flea beetles, aphids, leaf-hoppers, tuber moths, and the eel-worms. The insect enemies that attack the potato which are capable of control cause man a considerable loss in the defensive warfare he must constantly wage. In some cases spraying with arsenic compounds is effective, but during certain years the grower is forced to spray at least 16 times during a single season to protect his crop!

The flea beetle is a small, black

jumping beetle about one-sixteenth of an inch in length. The mature beetle eats small holes in the potato leaf, working from the under side. It thus is extremely difficult to control by the use of sprays of any kind. The eggs of the beetle are laid in the rubbish of the field and when hatched the larvae feed upon the underground portion of the plant including the tubes. Again man has dug in for a prolonged fight with this small insect. By using clean methods of cultivation and various devices for trapping the insect, a small measure of control is obtained.

The leaf-hopper has been known since 1853. It is a small, pale green insect about one-eighth of an inch long, with wings which fold over the back. It is very active and will jump and fly away on the slightest disturbance. It attacks the leaf of the potato plant causing shriveling and burning, thus reducing the yield of tubers. In many cases it destroys 50 per cent of the potato crop. On account of its active nature and the rapidity of reproduction, it is extremely difficult to control.

The eel-worm, while not strictly speaking an insect, is a very close ally. It attacks other members of the vegetable kingdom as well as the potato. It is widely distributed in the potato growing areas of America and does enormous damage every year. It attacks the roots and tubes, causing enlargements on the roots and making the tuber unsightly and of poor quality. Man is practically helpless against this enemy. He must give up growing potatoes where the eel-worm is present and attempt to grow other crops which it will not attack! Clean culture and rotation are helpful but no other remedial measures are of any value.

Sugar is an important article of human diet. It is produced mainly from the sugar cane and sugar beet. The insect race is competing with man for these two crops. In India the white ant has been successful in defeating man and the Indian farmer has been forced to give up the growing of ordinary sugar cane and has attempted to substitute Japanese sugar cane which has a repellent effect on the white ant. Whether this device will long be successful is an open question.

In the United States sugar is largely produced from the sugar beet which is grown almost exclusively in western America. In this region the beet leaf-hopper attacks the beet causing a disease known as curly leaf. When beets are attacked by the hopper, the leaves shrivel up, the growth ceases, and the crop is ruined. The beet leaf hopper has successfully ruined the sugar beet industry in many regions of the West. Idle factories and sugar beet lands given over to other crops are mute evidence of the success of the insect race in competing with man for the sugar beet crop. In Fallon, Nevada; Grand Junction, Colorado; in Utah and California, sugar beet factories are now idle largely because of this small insect. Man is helpless in the face of its efforts. No known methods are available for its control. Spraying, trapping, clean culture, rotation of crops, and all the ordinary methods usually used to combat the effects of insects are futile in case of the beet leaf-hopper. Nothing is being done about the matter and apparently nothing can be done. At present human efforts are being directed along the lines of finding some parasite in Mexico, the original home of the hopper, which will help man in his extremity.

Hay's Enemies

Hay is to agriculture what steel is to industry. Every type of forage crop used for hay has a large group of insect pests which compete with man for the crop. One of the most important forage crops is alfalfa. Alfalfa is really the basis of successful agriculture in western America. The alfalfa weevil has practically eliminated this crop in many regions of the Far West.

It was accidentally introduced into this country from Europe about 1904. A small field became infested near Salt Lake City, Utah, but it has now spread to all the surrounding states. It is a small insect which punctures the alfalfa stems as they begin to grow in early spring. The eggs are deposited in the wounds and the grubs hatch and feed upon the tender leaves until they are fully mature. And after transformation takes place, the adult beetle continues this destruction of the alfalfa crop until the field looks like an intense fire had swept it. Methods of control have been worked out, but it is a continuous war between the races to keep the weevil in check, let alone destroying him.

Cotton is vital to the welfare of man. It is essential as a source of fabric for clothing and also as means of the manufacture of a large group of other compounds useful in industry. The cotton plant is subject to attacks from the insects and probably none does as much damage as the small brown beetle known as the Mexican cotton boll-weevil. Both larvae and the adult weevil attack the cotton plant with vigor and destructiveness. They attack especially the squares and bolls and thus injure or destroy the fibre. With an unfavorable year for the weevil and by practicing clean methods of culture, whereby the crop residues such as dead stalks, dead bolls, and weeds are all destroyed by burning or burying, a certain measure of control of the weevil is secured. Spraying and dusting with lead arsenate also is used effectively in some areas. Even the aeroplane has been called into service in the fight against this destrutive insect and many thousands of acres are dusted with arsenic by this method. Even so the boll-weevil has forced a drastic readjustment of the agricultural practice in many areas. It may still be victorious over man.

In the warfare against the insects, the farmers constitute the shock troops of human civilization. They are bearing the brunt of the battle. Sometimes they are successful in the contest, but often they are not. The warfare goes on. Public attention is called to the progress of the war only when some dramatic events take place such as a marked invasion of locusts, grasshoppers, caterpillars, cutworms, or aphids which serve to draw the layman's attention to this terriffic struggle between the races. But the farmer is always face to face with the problem of insect control. The cost of carrying on the fight adds materially to the cost of producing food for human consumption and is a vital factor in creating the ever-present farm problem.

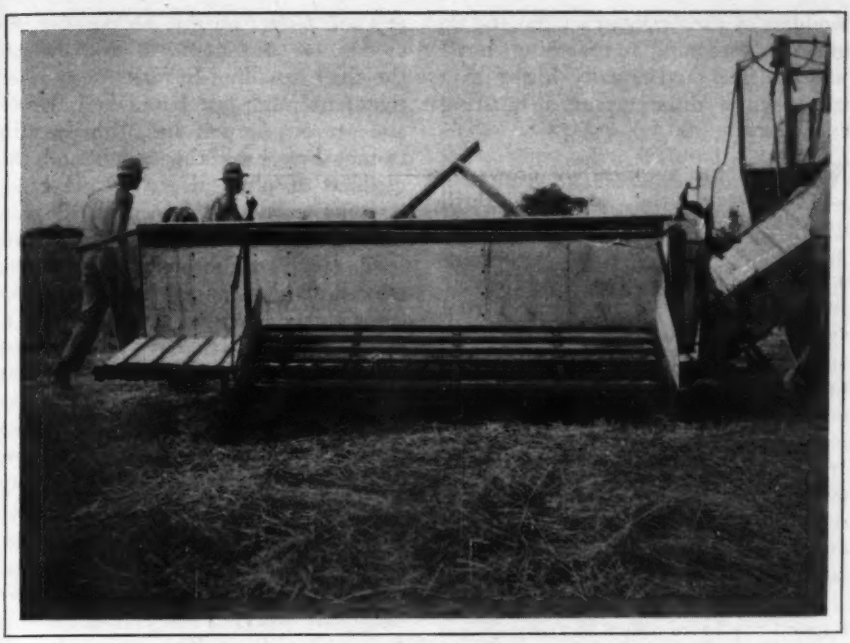
Will the last great battle for humanity occur when the stern competition for food between the races reduces the amount of food available and man himself will go down before the ravages of the carnivorous insects?

Combines for Clover

(*From page* 11)

During the past season there was a rather large acreage of red clover harvested for seed in western Oregon, but in general the yield was not up to standard. Many growers, however, report from 3 to 5 bushels per acre, which is a very satisfactory yield, especially when seed prices are running anywhere from 25 to 30 cents per pound.

The combines are being used in many ways now that the smaller ones are being manufactured. Many of the smaller farms are now using combines to handle grain crops, particularly



The "pick up" was put on this combine to work in rye grass.

wheat. Some growers have been using the combine to harvest rye grass. Combined rye grass, however, has heated and injured the germination of the seed. The growers, therefore, have resorted to the "pick-up." In general the pick-up has not been very satisfactory because rye grass shatters readily. The device gets the grass and puts it through the machine, but because of shattering the turn-out of seed is very small. There is no doubt that the pick-up would be satisfactory on crops that do not shatter.

Economics

(*From page* 4)

took home a little of the skimmilk doctrine and tried it on themselves.

Farmers once thought that the old sock and the twenty-hour day were the open roads to economy. Thoughtful economists must be credited with changing that, even as the safety razor has swept the facial forests of rural America.

Wealth is not always welfare nor is welfare a matter of wealth. Yet formal economists of the original kind had a conception that the value of human desire could usually be expressed in money. Out of this have arisen the proverbs, "money talks" and "every man has his price."

Economics is partly responsible for putting the "m" in m-art, which has made a market place of the picture gallery and a barter goal out of the musician's talent. They have tried to cover the flowers of life in a dust of logic based on our need for three square meals and a place to roost.

Income and happiness mean the same to the confirmed economist who sticks to the ledger and keeps his red ink bottle well filled. I know well that the weekly stipend is the staff of life on which we lean while we enjoy the

fess to know what it's all about are those who know the least.

WE who tasted the joys of the nickel cigar and the ten-cent movie need not waste a moment pining for the good old golden days of yore. The haughty abandon of a hickory shirt, one suspender, and a hound dog belong to the simple life one jump beyond Adam's apple. Yearn as we may for the simple and thrifty times we once enjoyed, they are now merely a record in the Doomesday Book. The penchant of the hour in glorified business economics is for us to be *envious* and *discriminating*. Both processes develop trade and give men enough work to do on a seven-hour day at union wages. Remember the idea and don't get out of step! He who so forgets himself as to read Henry George will not only find single tacks, but double tacks, strewn all around his parking place.

Yet whoever thinks that economics is dull because his head professor looked that way is off on the wrong track. Botany and astronomy treat of most wonderful things, compelling to the imagination and a challenge to the intellect. Yet many a teacher of both subjects spends so much time on rules and theories that his pupils never get the gleam of truth and the beauty of the vision seen in flowers and stars.

Economics deals with the everyday lives of humble men as well as the gigantic mergers and combinations that issue thunder to the financial world. Of late there has grown up a brand of economics that is of a social aspect, suffering neglect and a cold shoulder in some quarters where the empiric hand of money welfare holds sway. It is trying to teach us smaller fellows how to adjust our lives as best we may to meet the wave of industrial expansion and super-power.

The world stands at the threshold of constant change, with whispers of unknown forces and unreleased energies clamoring for service to mankind. My father used to fret about the world supply of coal when he bought his five tons annually. You wonder how long the oil and gas wells will keep flowing, and maybe take a chance on some stock against the day of scarcity. The march of science and invention steadily removes such whims and fears, and gives us all a new conception of the field of economics. As fast as the wants of men increase and they have money to buy them, somebody will have the answer.

ADJUSTMENTS must proceed along with invention, however. Our whole organization must make the most of our newly discovered resources and industrial achievements. In this age we are often apt to quit trying to think it all out because of the weary complexity of life. Yet I believe that the salvation of various groups of wage earners and producers lies in thinking things out. Running to Congress for relief or a sop of safety first is not going to solve the problem. When the groups have trained their leaders to think things out, then the groups may join forces and see what adjustments can be made for the entire population.

Of late some industrial groups have sought a superman who would by some legerdemain find the solution to all their economic troubles. There is no high priest of economics. Even the professors tell us that. Take a fling at the problem yourself from your own corner.

It may be a "hard life" and a "dreary grind." If we are servants of economics, we are masters of our own souls anyhow—as long as we are willing to think. And laying aside all levity, the best contributors to economic thought have probably been as useful and helpful to us in doing a decent day's work as any preacher strived to be.

Lastly, if you shy at the word "economics," call it "human welfare" and do something to make it real.

NO DROWNING REPORTED

Rastus, out in a boat with his best girl, Mandy, had been teasing for a kiss, but she refused again and again. Finally he became desperate.

"Mandy," he threatened, "effen you don't lemme kiss yo' I'se gwine to upset dis here boat."

Getting home, Mandy told her mother all about it.

"An' did you let de genman kiss you?" her mother asked.

"Well, did you all see anything in de paper dis mawnin' about two niggahs drownin'?"

Near-sighted old lady: "Look, there's a dear, old-fashioned girl. Her dress buttons all the way up the back."

Her daughter: "Nonsense, mother. That's her backbone."

A widow who had listened to a sermon over her dead husband, whispered to her son as the preacher sat down—

"Johnny, step to the coffin and see if that *really* is your father."

Young Harold was late for Sunday school, and the minister inquired the cause. "I was going fishing, but father wouldn't let me," announced the lad.

"That's the right kind of a father to have," replied the reverend gentleman. "Did he explain the reason why he would not let you go?"

"Yes, sir. He said there wasn't bait enough for two."—*Fulham Chronicle.*

WORTH ABOUT A DOLLAR

He: "I'm going to buy myself a harem."

It: "What do you mean? You can't buy a harem, can you?"

He: "Sure. I saw a sign at a gas station that said: 'Six gals. for a dollar.'"

Young Rastus had been very attentive to a colored girl friend for several months and finally his father Mose began to suspect that they were secretly married. In order to satisfy his curiosity he finally subjected Rastus to a severe questioning. After considerable evasion Rastus gave the unsatisfactory answer, "Well, I ain't sayin' I ain't."

"I ain't askin' ye is ye ain't," stormed Mose, "I'se askin' ye ain't ye is?"

LEFT TO ITS FATE

"I went to the dentist yesterday."

"Does the tooth still ache?"

"I don't know; he kept it."

Dear Old Soul (visiting her very sick brother): "I've a very nice letter from Emily. She says she's so sorry she ain't able to come and see you, but she hopes to be able to come to the funeral."

When the cat's away the mice will play—but maybe the cat's not having such a rotten time either.—*Life.*

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Soil-fertility is Nature's gift to farm products... *Power*-fertility is Timken's contribution to farm production, protection and profit.

Those whose interests are centered upon the problem of increasing farm prosperity know that, as in all industry, the farmer must reduce the ratio of cost to production to the lowest possible count if he is to survive and prosper.

And they realize the economic value of Timken Bearings in helping him to do so by increasing the efficiency and lengthening the life of all types of farm machinery—for Timken is *the one bearing that does all things well,* whether the loads are all *radial,* all *thrust or a combination of both*... through the exclusive combination of Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken steel.

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